HANDBOUND
AT THE
UNIVERSITY OF

List 440
1
21

THE AMERICAN ARCHITECT AND BUILDING NEWS

VOLUME XXIII

JANUARY-JUNE 1888

93834
30/9/08

TICKNOR & CO. PUBLISHERS.
211 TREMONT ST. BOSTON.

HELIOTYPE

L. S. IPSEN DEL.

NA
1
A322
v.23

SCHOOL OF PRACTICAL SCIENCE TORONTO

THE AMERICAN ARCHITECT AND BUILDING NEWS

INDEX TO VOLUME XXIII.

JANUARY—JUNE, 1888.

ILLUSTRATIONS.

[*The figures refer to the number of the journal, and not to the page.*]

CLUB-HOUSES.

DETAILS.

DWELLINGS.

GOTHIC SPIRES AND TOWERS.

[*Published only in the Imperial Edition.*]

INDEX BY LOCATION.

[*The figures refer to the number of the journal, and not to the page.*]

The American Architect and Building News.

Vol. XXIII. Copyright, 1888, by Ticknor & Company, Boston, Mass. No. 628.

JANUARY 7, 1888.

Entered at the Post-Office at Boston as second-class matter.

CONTENTS

MR. FRANK CUSHING, the young ethnologist who became by adoption a Zuñi Indian in order to study the habits and history of the sedentary or Pueblo tribes, is now engaged in an exploring expedition among the ruins of the great aboriginal settlements in Arizona. It has long been known that a certain river-valley, now a desert, was once filled with flourishing towns, and the curious remains of houses which occupied the terraces along the valley have attracted the attention of tourists, but no one, before Mr. Cushing, has had leisure to excavate among the ruins. Guided by his knowledge of the customs of the existing tribes from the same stock, Mr. Cushing's researches have been very fruitful, and he has found proofs of the occupation of the valley at a very remote period by a population of something like a quarter of a million. To support this population, the desert tract was irrigated by open canals, cut, in many places, in the rock, and extending over a length of about three hundred miles. A race rich enough and civilized enough to build three hundred miles of canals to irrigate its fields must have accumulated a considerable amount of portable property, and a great number of specimens of pottery, stone implements and skeletons have been found and sent East. Curiously enough, the excavations afford abundant evidence that the towns, instead of falling gradually into decay, were destroyed by a series of earthquakes. The walls have been thrown outward and the roofs, which were of concrete, supported on wooden beams, have fallen in, and in many cases the skeletons of the occupants have been found as they were struck down in the act of escaping. One skeleton in particular affords a curious glimpse of the circumstances of a catastrophe which, as Mr. Cushing thinks, took place before the building of the Pyramids of Egypt. It is that of a young girl, and was found surrounded by sacrificial offerings, close to an altar in a cave in the side of the mountain, which seems to have been used as a sacred place. We must presume that ethnologists keep their imaginations in subjection and reason from nothing but facts, but of these they seem to have discovered so many that the expedition is convinced that this Toltec Iphigenia, after several shocks of earthquake, was sacrificed as a supreme offering to the offended gods, and it thinks that on the return of the citizens to their homes after this appalling ceremony, another shock, more violent than any that preceded it, overwhelmed them, leaving, perhaps, none to tell the tale. It is a curious illustration of the almost indefinite persistence of tradition among ignorant races that, although this catastrophe must have occurred, apparently, about seven thousand years ago, the Indians of the neighborhood still speak with dread of the malicious spirits who dwell in the heights above the valley, and their fears gained from the whites the name of the Superstition Mountains for the range long before anything was known of the tragedy which had been enacted in their shadow.

A FEW weeks ago it was found that water was coming through the marble slabs which form the roof of the Girard College building in Philadelphia, and on looking for the cause it was found that the surface of the stone was somewhat seriously disintegrated, and that the corrosion had extended into the joints. The walls and columns showed no sign of being affected, and after consultation with a well-known Philadelphia architect, Mr. Windrim, who readily explained the phenomenon as being the result of the superficial decomposition of the marble by the sulphurous acid contained in the Philadelphia atmosphere, and brought to the roof by rain, the directors of the College decided to cover the stone with tin. Of course, the newspaper reporters seized upon the circumstance as a text for the most startling fancies. One of them announced that pieces of marble "an inch square" from the College roof "could be crushed between the fingers," and asked gravely whether the citizens of Philadelphia might not "awake some morning after a rain-storm to discover a mass of slaked lime in the middle of Penn Square," in place of the present City-hall, following up this lugubrious thought with the suggestion that it might some time "become necessary to erect a huge canopy of tin to house the Public Buildings." It is rather amusing to think of putting a tin canopy over a marble building to "protect" it, but apart from this, the way in which the Girard roof was affected is interesting. With most marbles, exposed as in this case for forty years, corrosion would have proceeded much farther, and it might have been necessary before now to replace the whole roof, but Dr. Walter was one of the best judges of building marble that ever lived, and the walls and colonnades of the structure are probably safe for ages. Whether it would be possible, with any marble, to make a flat roof which would withstand the acid rain of a great manufacturing city for forty years is extremely doubtful. The marble roof of Milan Cathedral must in places be five hundred years old, but most of it probably dates only from the beginning of the present century, and it is constantly under repair, while the atmosphere of Milan is far purer than that of Philadelphia. For some reason an exposed horizontal surface of stone deteriorates far more rapidly than a vertical, or even a somewhat inclined surface. In old graveyards, even in the pure air of the country, the top of a marble tomb-cover or horizontal tablet of any kind, which is more than a hundred years old, is generally powdery with decomposed carbonate of lime, and leaves white, chalky marks on the clothes or fingers, while the vertical surfaces, particularly if protected slightly by a projecting cornice, retain their polish indefinitely. Dr. Walter's opinion was that dolomite, or marble containing magnesia, like that found near New York, and in many other places, resists weathering far more efficiently than the pure limestone marbles, and he always used the dolomitic varieties in his own work.

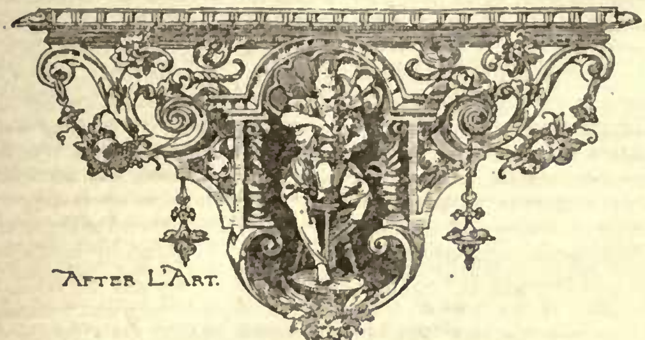
AN EXTRAORDINARY exhibition took place a few days ago in Philadelphia, where the stockholders of the Keely Motor Company held a meeting, swallowed without a murmur the largest and most highly-flavored doses of impudence, to call it by no worse name, that have ever been offered to that long-suffering corporation, and finally adjourned, after voting to raise more money to go on with the "investigations" for which they have already contributed so much. If we recollect rightly, the last important stockholders' meeting was made joyful by the announcement that within a few weeks a locomotive, propelled by "sympathetic vibrations," would be running regularly on one of the Pennsylvania railroads, and that other machinery, employing the same motive power, would be put in operation as fast as it could be put together. Years have elapsed since then, but no sympathetic locomotive has ever yet moved on a railroad in Pennsylvania or elsewhere, nor has the vibratory force been utilized for any service which has brought income to the corporation; yet, instead of an apology for this trifling, the official communication from the great inventor to the stockholders who have maintained him so long in luxury for so many years is said to have contained the announcement that as the company "had not for years furnished him any money to carry on his experiments," he had resumed "the exclusive ownership of his inventions," and had "been obliged" to form a new association with these inventions as its basis, and "to issue and sell certificates of stock in the new company" in order to raise the money he wanted.

This astounding message to the official meeting of a corporation whose stockholders have expended two hundred and fifty thousand dollars on their great principal's patents and "experiments," seems to have attracted the attention of no one except the retiring President, who mildly remarked that he hoped that in all these new transactions "the interests of the present shareholders would be guarded," but did not mention how he would propose to guard them from a person who had, according to his own statement, appropriated all the interests they had, and sold them to some one else. A much greater sensation was excited when Mr. Keely's counsel read the other portion of the report, in which it was announced that after reaching the point of promising to drag locomotives around by sympathetic vibrations, and actually showing a coffee-mill at work, attached to a "vaporic generator," he was "baffled by a mechanical difficulty that was impossible for him to overcome," and had since then devoted his attention to the construction of a "sympathetic liberator," which will transmit an "uplifting expansive force" of twenty-five thousand pounds per square inch through a wire, and now occupies all his attention. In his own opinion the success of this "new departure" would be greater than the most sanguine of his adherents had anticipated, but, although he was expecting to receive in a few weeks some machinery which would go far toward perfecting his discovery, he "would not venture to predict how soon his work would be concluded." As a confirmation of this interesting statement, his counsel read a supplementary report, drawn up by himself at Mr. Keely's request, in which he expressed the opinion that the great inventor "had reached the sphere of perfect vibratory sympathy." This cheered the stockholders to such a degree that they immediately raised the appropriation for expenses, without waiting to inquire whether it was they or the shareholders of the other company that the great man proposed to be in "vibratory sympathy" with for the future, and then adjourned, to wait with patience for the appearance of the "sympathetic liberator" in the mechanical world.

A CURIOUS illustration of the truth of General Grant's maxim, that the best way to get a bad law changed was to enforce it rigidly, is furnished by a case now on trial in New York. Every one knows something of what is called the "contract labor law," by which American citizens are forbidden, under heavy penalties, to engage foreigners to come to this country to work for them, an exception being made only in cases where the imported laborers are experts in an art which has not previously been practised in the United States and which the citizens of that enlightened country will have an opportunity of learning from the new-comers. Apparently, the law had its origin in the desire of unthinking legislators to please some of their recently-naturalized constituents, who had a dull notion that they would be in some way the gainers by shutting the gates through which they had themselves entered and monopolizing the trade which they professed, but its principal effect has been to enable mischief-makers to annoy such manufacturers as might show enterprise or public spirit enough to wish to raise the standard of skill in their business or to defend themselves against Union tyranny. Within a short time it has occurred to some one that the law applies to laborers in other fields than that of manual toil, and that a considerable commotion might be caused by trying its virtues with regard to people belonging to trades in which it is not the fashion to surrender one's common-sense into other people's keeping. With this view, an attack has lately been made upon the Corporation of Trinity Church in New York. The Trinity wardens have, it seems, recently engaged as assistant in the church a young English clergyman, who has already entered upon his duties. Innocent as this transaction seems, it involves, as we now learn, and as, in fact, cannot be denied, a flagrant violation of the statute. If the wardens had wished to do their duty as good citizens, they should have gone to Castle Garden and watched for emigrants with white neckties, and when they saw one of prepossessing appearance, have accosted him, promising him suitable wages for his labor. They would then have been blameless, and, as fast as their new priests disappeared with such portable property as might be at hand, they could have engaged new ones until the supply of clerical emigrants was exhausted. This method of hiring, although perhaps not satisfactory at all points, is permitted by the law, but any attempt at getting persons of known character to come from foreign parts to render a definite service is clearly forbidden, and, unless the plea can be made that the cure of souls on Mr. Warren's plan is a new and useful industry, we do not see how the Trinity parish can escape a heavy fine. A still more interesting phase of the matter is, however, to be found in the glimpse which it gives us of the possibilities of the future unless the statute law is soon repealed or modified. As the law now stands, not only the English clergymen, who are tolerably numerous in this country, but the foreign opera-singers, dancers, actors and actresses, lecturers, pianists and other musicians, professors, teachers and artists, who come by invitation and promise of reward to instruct and delight us, are here in defiance of the laws of the United States, and must, according to those laws, be shipped back at once to their native country by the United States marshal, if he can catch them, while those persons who invited them to come here are subject to severe punishment. There is no difference between the cases of these persons and the Canadian ship-carpenters who were made to experience the rigor of the statute a year or two ago. Our native songsters and divines have just as much a right to protection against foreign competition as the Detroit boat-builders or the New England weavers, and the arrest and expulsion from the country of Colonel Mapleson's opera troupe, for example, with the exile to the Dry Tortugas of a few impresarios and church committees, would teach the bloated aristocrats of the country a lesson in regard to the claims of native and naturalized talent, which seems as yet to have been thoroughly learned only by the working-classes.

A CANVASS is being made of the colored population of the country for the purpose of raising funds for the erection of a monument to commemorate the part which the African race took in our Civil War. While it would be unfortunate to distinguish in general by the accident of ancestry among the patriotic citizens who took up arms in defence of what they considered to be their country, the position of the colored population in relation to the great struggle was a peculiar one. If they had not lived in one section, under conditions which were unknown in the other section, the war would have been impossible, and as one of the results of it was to change profoundly the condition and prospects of the race in America, there is certainly good reason for wishing to commemorate a series of events which changed four million slaves into freemen and citizens and called thousands of colored men to arms, to fight heroically for the cause which had become their own. To use a common simile, the four-years' war was to the negroes something what the Exodus from Egypt was to the Israelites, and, although the children of Israel, after the crossing of the Red Sea, had to wander forty years in the Wilderness before reaching the Promised Land, and it will probably be more than forty years from the date of the Emancipation proclamation before the colored people of the South acquire full recognition of their rights as citizens, nevertheless, the beginning of the pilgrimage is an event which should never be forgotten, and the Joshuas and Aarons of the movement, while the memory of them is fresh in the minds of their followers, ought to be honored with permanent memorials. The intention of the leaders of the movement is to raise, if possible, a million dollars, and erect with the money a monument at Washington which shall consist of a central design commemoratory of the part taken by the colored race in the war, surrounded by memorials of the individuals most distinguished in the emancipation movement. If properly managed, this scheme ought to be one of the most successful, from an artistic point of view, of those which the war has suggested. After the iron-foundries began keeping soldiers' monuments in stock, whatever sentiment had once attached to those structures evaporated, and it is a rare thing to be able to extract an idea from the compositions of granite obelisks and deformed lay-figures which occupy the most prominent positions in our larger towns, but the theme of the colored men's monument is full of suggestions. Fortunately, there is never likely to be more than one, so that the designer of it will not suffer the annoyance of seeing his ideas caricatured elsewhere, but with the strange, wild history of the Southern slaves in 1863–64 to inspire him, it would be strange if a man of decent abilities could not evolve a monument which should excite more attention, at least, than anything of the kind which now exists in Washington.

LANDSCAPE GARDENING.[1] — III.



AS it is difficult for the student of landscape-gardening to find teachers in the more artistic departments of his work, there is all the more reason why he should master the teachings of books. The literature of the art is not so large as might be expected, nor am I at all competent to draw up a catalogue which would show its actual extent. But even a partial list of prominent works may be useful, so great seems to be the ignorance of the public with regard to them. These, then, are a few of the books which may be studied:

MOREL — "*Théorie des jardins.*"
GIRARDIN — "*Composition des paysages.*"
HORACE WALPOLE — "*Essay on Gardening.*"
HIRSCHFELD — "*Théorie de l'art des jardins.*"
PRINCE DE LIGNE — "*Coup d'œil sur Belœil.*"
GILPIN — "*Forest Scenery;*" "*Practical Hints on Landscape-Gardening.*"
WHATELY — "*Observations on Modern Gardening.*"
WEIVERT — "*Die schoene Landbaukunst.*"
BAUMGARTNER — "*Idées pour la décoration des jardins.*"
SIEGEL — "*Description des jardins modernes.*"
REPTON — "*Theory and Practice of Landscape-Gardening*"; "*Fragments on Landscape-Gardening*"; "*Sketches and Hints on Landscape-Gardening.*"
CURTEN — "*Essai sur les jardins.*"
LOUDON — "*Treatise on Forming Country Residences.*"
UVEDALE PRICE — "*On the Picturesque*" (Edited by Sir J. Dick Lauder.)
THOUIN — "*Plans raisonnés des jardins.*"
LABORDE — "*Description des nouveaux jardins de France.*"
SEELEY — "*Description of Stowe.*"
MASON — "*Essay on Gardening.*"
LAUGIER — "*Essai sur l'architecture.*"
CHAMBERS — "*Dissertation on Oriental Gardening.*"

All these are books which date from the last century or from the first quarter of our own. It is needless to name works of earlier origin than these. They deal of course, with those more formal developments of the art which are infinitely beautiful when well managed in the right place and the study of which is essential to the cultivation of the student's mind and taste, but which from a practical point of view are less helpful to him than those later developments to which the word *landscapes* may more truthfully be applied. And besides, they are works of classic reputation which will be found in any catalogue that contains architectural treatises of the same period. Architecture and gardening were, in truth, so closely united in the seventeenth century that books which deal with the one art very often deal with the other too.

Between the year 1820 and times which may be called our own, few treatises upon the art seem to have been written. The best of all recent books — indeed, I think the most illuminative of all extant books — is the work of M. Edouard André already referred to — "*L'Art des jardins.*" A few others are:

ROBINSON — "*Parks and Gardens of Paris*": "*The Wild Garden.*"
VITET — "*Etudes sur l'histoire de l'art,*" Vol. IV.
CHOULOY — "*L'Art des jardins.*"
MEYER — "*Lehrbuch der schoenen Gartenkunst.*"
RUPRICH-ROBERT — "*La Flore Ornementale.*"
ANDRÉ — "*Un mois en Russie.*"
SMITH — "*Parks and Pleasure Grounds.*"
KENNION — "*Trees in Landscape.*"
LOUDON — "*Encyclopedia of Landscape-Gardening.*"
KOCH — "*Dendrologie.*"
DOWNING — "*Landscape-Gardening*" (Edited by Sargent); "*Rural Essays*"; "*Villa and Cottage Architecture.*"
SCOTT — "*The Art of Beautifying Home Grounds.*"
WEIDENMANN — "*Beautifying Country Homes.*"
KERN — "*Practical Landscape-Gardening.*"

These last four authors are Americans and their works, therefore, are especially interesting to the student who must work amid the same conditions. Scott's book has already been referred to. Although intended primarily for the amateur it will be very helpful to the professional student if he absorbs the principles it lays down and looks with a discriminating eye at its many illustrations. These last, however, cannot always be accepted as patterns of excellence, nor are the author's applications of his theories always as good as the theories themselves. Of his constructive work I cannot speak, but his book seems to reveal a man with more intelligence than taste — one who mentally recognizes what is right but is not always able to tell the best from the less good in special cases. Weidenmann's and Kern's books I have not read, but M. André cites them with respect. Downing's are extremely good — quite invaluable to the American beginner. Some day, when this art is understood and valued as it should be, Downing's will be recognized as one of the great names in the intellectual history of America. A pioneer in what, if not an actual wilderness, was a wilderness of ignorance, bad taste and indifference, he showed, alike in his writings and his practical results, the true spirit of an artist and the true instincts of a man of intelligence, education and taste. The places he laid out or altered — especially along the Hudson River — are still among the very best in the country; and almost all the good work which has since been done, including Mr. Olmsted's, may be traced back to his inspirations, while such measure of popular interest and good taste as we can lay claim to has almost altogether sprung from the same source. Twenty years ago his books were on every one's shelf and it would be well if as much could be said to-day. In architecture his taste was about on a level with that of his time — which is to say, was pretty bad. Yet even as regards architecture he had a good influence in so far that he first in his generation drew popular attention to its claims. And as regards landscape-gardening his ideas were far ahead of his time — and are still far ahead of ours if we may judge ideas by average results.

Koch's "*Dendrologie*" is a collection of lectures which treat in part of certain classes of trees, but also contain an interesting summary of the history of landscape-gardening in all ages of the world.

Outside of books like those I have mentioned, there are many others of many periods which it will profit the student to acquaint himself with. The love of Nature is as old as the world, and, strange though it may seem, expressed itself for ages in a love for cultivated Nature before the attractions of wild scenery were perceived. Literature which descants upon these latter charms is of comparatively modern origin, but literature which speaks or sings the praise of gardens begins almost as far back as history takes us. Roman literature, for example, as I need hardly say, is full of it, and though such writing gives the student no practical instruction, it profits by awakening enthusiasm and stirring his artistic sense. Then, as we come farther down in time, we find a great deal of writing which has a more definite though not exactly a practical bearing upon modern work. So poetic, so idyllic in its nature is the landscape-gardener's art (specially so-called as distinguished from the formal gardening art of elder days), that we have no real right to be surprised when we find that before it actually began it was preached and foreshadowed by poets and essayists. The first great garden on the true landscape pattern of which we know was not created in tangible shape, but was pictured in "*Paradise Lost.*" And from Milton's day onwards far into the eighteenth century, we find the poets and essayists teaching the landscape-gardener how he should conceive and sometimes how he should execute his tasks. Bacon, Pope, Addison, Mason, White of Selborne, Thomson, Gray, Delille, Rousseau and Goethe all have written many pages which should have a fertilizing influence upon the student if he has a soul to be stirred as well as a body to be nourished by his art.

Numberless English, French and German books of practical as distinct from artistic or poetic bearing have been published during the past twenty years. A few of them may be cited as guides to the finding of others, although, of course, some are more valuable to foreign than to American readers:

DE LAMBERTYE — "*Conseils aux habitants des campagnes.*"
DECAISNE ET NAUDIN — "*Manuel de l'amateur des jardins.*"
JACQUES (and others) — "*Manuel général des plantes.*"
CARRIERE — "*Traité général des conifères.*"
ROBINSON — "*Alpine Flowers*" giving advice about rock work, etc.)
VILMORIN ET ANDRIEUX — "*Les Fleurs de pleine terre.*"
ANDRÉ — "*Plantes a feuillage ornemental.*"
DU BREUIL — "*Cours d'arboriculture*"; "*Arbres et arbuisseaux.*"
ANDRÉ — "*Les Plantes de terre de bruyère.*"
STEWART — "*The Planter's Guide.*"
THOMSON — "*Handy-Book of the Flower-Garden.*"

And to these and such as these may be added books on the principles of color like those of Chevreuil and of Root.

More American works of similar kinds must exist than I have chanced to hear about. I can only suggest that it would be well to supplement strict botanical works by those like Emerson's "*Trees and Shrubs of Massachusetts,*" which describes the aspect as well as the characteristics of each species in a very clear and suggestive way. Professor Sargent's catalogue of the Jesup collection of American woods is also extremely useful as giving in compact shape not only a full list of all our native trees, but also the average sizes which they attain and the geographical limits within which they are

[1] Continued from page 264, No. 623.

at home.[1] American literature as well as English also offers a number of works of a descriptive sort which should please and inspire though they may not actually teach the student. The love of Nature and the habits of observation shown in the writings of Thoreau. for instance, and at the present moment of Charles Abbott and John Burroughs may do much to cultivate the same qualities in the reader.

It may seem a strange and it certainly is an unfortunate fact that there is to-day no periodical which either gives the landscape-gardener theoretic counsels or enables him to follow what is being done in the world in his profession. Such journals as the *Revue Horticole, the Revue de l'horticulture belge et étrangère, the Hamburger Garten und Blumenzeitung, the Journal of Horticulture, the Garden and the Gardener's Chronicle*, confine themselves altogether within the limits which their titles suggest. Even the first-named, although edited by M. André, does not treat of landscape art, but merely of some of the materials by means of which it works. In our own country, when Downing was alive, his words alone sufficed to give artistic value to the periodical for which he wrote — *the Horticulturist*, if I am not mistaken. But to-day we are no better off than our neighbors.

To turn away now from books to the living world, a word or two may be added with regard to sketching from Nature. Practice in this direction, if within the student's power, is, of course, useful not only as facilitating the execution of his working plans, and teaching him how to record the characteristics of those actual sites with which he will be called upon to deal, but also as training his eye to value the nicer relations of outlines, colors and masses. But I think he should guard himself against putting too high a value upon his sketches after they are made. They will differ from the works of professed painters in being records of Nature's casual results instead of careful, artistic adaptations — idealizations — of those results; and as such they are likely to be far less rich in suggestions with regard to the effects he himself must secure when he begins actual work. Moreover, too great a love for the generalized, undetailed charms proper to a sketch may foster a tendency to generalize, and, so to say, sketch too much when he addresses himself to concrete problems. As has been said before, the landscape-artist must, like the painter, think first and most of his general effect; but the care which he must give to all matters of detail is far greater since his public cannot be kept at a given distance, and, therefore, each feature in his composition is likely in its turn to become a foreground feature. But he has a quite modern helper which may profitably supplement his pencil. It seems to me that photography from Nature offers him an excellent means of study, as well as an invaluable means of storing up helpful memoranda. While photographing, as well as while drawing from Nature, he will learn to see the difference between good composition and bad, between effective and ineffective massing, between the changes wrought by different kinds of illumination, between "variety in unity" and a mere heterogeneous accumulation of features. He will also gradually acquaint himself with the characteristic forms and manners of growth of the various species of plants. And the pictures he produces, being much fuller of detail, will furnish him with a more valuable store of suggestions for his future work than any amount of sketches he may be able to produce. And then, not every one can learn to sketch, while every one can learn to photograph. Nor is it a very costly or laborious pursuit, since a small portable camera for instantaneous work will serve quite well enough.

The most important general counsel which can be given a student is to avoid all disposition to that narrowness of taste which will end by making him, as an artist, a man of set ideas, narrow schemes and mannerisms. Appropriateness is the prime virtue in landscape as it is in architectural work. But there is, perhaps, even more danger that the landscape-gardener will sin against it than that the architect will — even more danger that he will become a mannerist. The "styles" into which his art may be divided are as distinct as architectural styles; but the distinctions between them are more subtile, they pass more insensibly into each other, and it takes a very sensitive taste to decide when the one should be employed, and when the other, or when the best result may spring from a combination of several kinds of effect in the different parts of a large composition. A landscape is not a park, nor a park a garden, nor a garden a lawn, nor a lawn a shrubbery, nor a shrubbery a front-yard; nor is the aspect which each should wear, or the sentiment it should express by any means always the same. But there are no set rules which mark off the one from the other, nor any formulas by means of which even a "correct" treatment may be arrived at. Great as may be the diversity between an architect's different problems, the diversity between a landscape-gardener's is still greater; it may be called, in fact, coëxtensive with the actual number of his tasks. No two sites are ever exactly the same, and to secure appropriateness of effect the site must be as careful consulted as the buildings which may be planned to stand upon it, or the pecuniary resources, tastes and occupations of the client. Moreover, the elements out of which he must create his work of art are not codified as are the architect's. When he wants to design, every tiniest detail as well as every great feature must be settled upon by himself. He is thus the freest of all artists, but in his very freedom lies the danger that he will become a mannerist. It requires very catholic tastes, sensitive perceptions and conscientious alertness of enthusiasm to keep him from "getting round" his ever-varying difficulties by clinging to some single kind of effect, repeating some two or three features, and narrowing his almost unmanageably rich vocabulary down to a small list of plants to be combined and recombined with small regard to perfect fitness. If he proceeds thus he may produce fairly good work now and then, but will often produce very bad work, and never work which is quite as good as it ought to be. Even such a broad preference as that which would say, "Natural-seeming effects are better than formal effects" ought not to be indulged. That effect is best which is most appropriate, and when architecture comes prominently into the scheme, formality of the sort which means even clipped trees and trimmed hedges and discreetly colored pattern-beds may be the right thing, and an attempt at a landscape effect may be as wrong — though hardly as vulgar — a thing as is the formality, for example, of those hideously colored pattern-beds which in the Public Garden of Boston ruin what ought to be a landscape effect of the utmost purity, peace and softness.

In conclusion I may return to what I said in my first article about the influence which the architect may exert upon the progress of this sister-art. Too often in the past he has been, although unconsciously no doubt, its foe. Every time an architect has insisted upon placing his building as he thought it would show to the best advantage without narrowly considering how the whole place, whether great or small, might be treated to the best advantage, he has sinned against both his client and the art of landscape-gardening, while the chances are that he has defrauded himself, too — that had he consulted other rights than his own, his building would eventually have profited. Simply to be conspicuously placed is not always for a building to be well placed, though in many cases its designer seems to have thought as much.

Something more is needed than that an architect should advise his client to call in a landscape-artist when his own work has been done. Even this advice is not so often given as one might think — too frequently he seems to believe that an artist is needed for every building, but that Nature, chance and the client are competent to manage trees and water and surrounding surfaces and distant views. Each artist is equally needed, and the chief need is that they should work together from the very outset. If the landscape-gardener has studied architecture as he should, he is at least as competent as the architect to decide where a building should be placed to look well from a distance; and if he understands his own art, he is far better able to decide where it should be placed in order that the outside world shall look well from its windows — quite as important a consideration to its owners. Moreover, he alone can see the best suggestions of the site with regard to the laying-out of approaches and the establishment of all minor constructions, while his advice may be very helpful even in the question, what sort of an architectural design will best suit the locality? An architect ought to be willing to make great personal sacrifices, if it is proved to him that great benefit to general beauty in the common result will follow; but very often no such sacrifices will be needed. Very often such slight modifications of his wishes as the stubbornest spirit would not object to making may result in all the difference between a well-laid-out place with convenient dependencies and beautiful views, and a botched place whose owners, if they have eyes to see, will be perpetually tormented by the thought of what so easily might have been. Moreover, in certain things which are actually of an architectural sort the landscape-gardener should be allowed to aid with a very free hand — in all of those which come in close contact with natural features. Piazzas, terraces, external stairs, steps and seats, summer-houses, boat-houses, bridges, balustrades and boundary-walls should, whenever possible, be built with his assistance.

Whenever we find ourselves considering what are the duties of the architect towards other arists, or how he should try to perfect his own results by incorporating theirs, we find ourselves thinking of Mr. Richardson as a shining example of rectitude. He was constantly turning to Mr. Olmsted for advice, even in those cases where it seemed as though it could have little practical bearing upon his design. And where it could have more conspicuous bearing he worked with him as a brother-artist of equal rank and of equal rights with himself. The Town-Hall at North Easton may be cited as one example of the extraordinary success which can spring from such coöperation, and Mr. Richardson was never tired of explaining how invaluable in this case had been Mr. Olmsted's assistance.

So firm a grasp of the essentials of architectual excellence as Mr. Olmsted possesses, and so true a taste with regard to architectural beauty, are, of course, exceptional. But something akin to them should be striven for by every student of landscape-gardening as one of the prime requirements of his art. Few landscape-gardeners can hope ever to put themselves as nobly on record with regard to actual architectural work as Mr. Olmsted has recently done in those alterations of the Capitol at Washington which are to be largely credited to his inspiration and his oversight. But they must, at least, put themselves on record as intelligent assistants in the architectural schemes of others if they would merit the name of artists in their own department. On the other hand, with the best will in the world

[1] The Arboretum which Professor Sargent is now planting for Harvard College in Bussey Park near Boston, will in future years afford the student an invaluable means of acquainting himself with all the trees and shrubs, native and foreign, which are hardy in that climate. Even in its present incomplete and immature condition, the help it may give him is considerable. And the way in which it has been planned should be studied as an excellent application of the highest principles of landscape-gardening. The formality usually involved in such scientific assemblages of plants has been entirely avoided, and the Arboretum will form an harmonious and beautiful part of a rural park. Yet in itself it is as scientific in arrangement as though utility only had been considered.

not every architect will always be able to secure competent assistance of the sort I have described. Mr. Richardson had Mr. Olmsted living at his gates, and Mr. Richardson had, too, a singular power of persuading his clients to do whatever he thought best. For fear that such advantages as these may lack — and as things stand just now with the art of landscape-gardening they often must lack — would it not be well if every architectural student should gain some knowledge of the sister-craft, at least as regards the general artistic principles upon which it rests, and the main things it requires of a building when elsewhere placed than in a city street?

M. G. VAN RENSSELAER.

UNITED STATES GOVERNMENT BUILDING PRACTICE.[1] — VIII.

PAVING, ROADWAYS AND CURBING.

DETAIL OF TOMB CATHEDRAL OF AMIENS

PAVING for sidewalks and for streets and roadways, made of almost every material known and used for the purpose in the United States has been used by the Government around its buildings. The kind of material is determined frequently by what is most in use in the particular locality for which the work is required, the character or expensiveness of the building for which it is needed, or by the amount of money available for the work.

For paving of sidewalks, the materials most often used are artificial stone and brick, and for paving roadways, streets, etc., Belgian blocks, concrete and macadam.

Bids are received in one lump-sum for all the work on the approaches, including sidewalks, driveways, walks, curbing, fence-coping, grading, sodding, etc. Fence-coping, grading and sodding have been treated in previous papers.

SPECIFICATION.

The plan of approaches shows clearly the paved sidewalks, drives, walks, roadways and the lines of curbing, etc.

Excavating. — All excavating for sidewalks, roadways, curbing, etc., to be performed by the contractor to the proper depth; also, any filling-in, grading, ramming, etc., that may be necessary for the proper execution of the work.

Brick Paving. — Brick paving to be with good hard paving-bricks, sound and square, laid flat, herring-bone fashion, on a bed of sand from 4″ to 6″ deep. [Some soils require a deeper bed of sand and in some places in addition a bed of furnace-clinkers, cinders, etc., is put down before the sand.] After the bricks are laid and graded (which should be about 1″ in 10′) to drain water to curb or to its proper outlet, the entire surface must be covered with sand, which must be left to work into the joints or swept over the bricks until the joints are thoroughly filled; or, to make a better pavement, the joints should be grouted in liquid mortar and the sand spread over afterwards.

Where gutters are to be formed with brick, the bricks in the centre should be laid lengthwise and the joints should always be grouted in liquid cement-mortar. Where extra thickness of wearing surface is required, the bricks may be laid on edge and grouted or covered with sand as before.

Brick and Cement Pavement. — A pavement made of brick and cement is often laid by the Government in Southern cities. It has a base of furnace-clinkers or clean sharp sand 4″ deep rammed and packed solid, on which brick is laid flat to an even surface; after being well wet, all the interstices to be thoroughly grouted with liquid cement-mortar; another layer of paving-brick is laid flat on top, breaking joint both ways with ¼″ thick layer of mortar between the bricks, and the top layer also grouted in liquid mortar. The wearing-surface to be ¾″ thick cement-mortar, composed of one part cement and one part of finely-crushed granite or sand. When the wearing-surface for this pavement has been laid of the cheaper grades of cement, it has not stood well, but when laid of good Portland cement, it makes a good pavement.

Stone Flagging. — Where stone flagging is used, it is to have a base of sand not less than 4″ deep. The flagging may be bluestone from 3″ to 5″ thick or granite or limestone from 6″ to 10″ thick, the stones generally to be rectangular in sizes from 2′ x 4′ to 5′ x 10′; to be properly dressed at corners to fit against curbing, etc; the backs to be roughly pitched off to a fair surface, and the joints to be square from the top and to fit close; the top, if of bluestone, to be the split surface, smoothed or planed off; if of granite, to be good pean-hammered work, and if of limestone, to be sawed, square-drove or tooled work; all the flagging to have a regular grade to curb, to be jointed in cement-mortar, and also grouted full with liquid mortar.

Concrete and Artificial-stone Pavements. — All concrete, asphalt and artificial-stone pavements to have for a base a bed of concrete from 6″ to 10″ deep, composed of five parts by measure of clean, small, broken stone (not larger than 2″ in diameter), brick-bats, furnace-slag or cinders, one part of good American cement, and two parts of clean, sharp sand, laid in same manner as concrete for foundations.

Cement Floor. — For cellar floors and sidewalks the wearing-surface may be ¾″ to 1½″ thick, composed of one part by measure of Portland cement and one part sand.

Asphalt Pavement. — Asphalt is used for the wearing-surface for floors, sidewalks and driveways. For floors and sidewalks it is made from ½″ to 1½″ thick, and for driveways it is made from 1½″ to 2″ thick. It is composed of two parts by measure of asphalt (unmixed with the products of coal-tar), with twenty per cent of heavy petroleum oil, five parts of sand, one part of powdered carbonate of lime, and one part of pitch. The concrete base must be perfectly dry before the wearing-surface is laid on, which must be properly crowned, graded, rammed and rolled. A surface is also sometimes made of about five-eighths sand three-eighths asphalt.

The street pavement in the District of Columbia is usually made on a 6″ base of concrete, with a cushion coat of asphalt ½″ thick, and wearing-surface of asphalt, petroleum oil, sand, pitch, etc., of above proportions 2″ thick.

Artificial-Stone Pavement. — All artificial stone is practically the same, the principal ingredients being Portland cement, crushed stone and sand. In the ordinary pavements clean, sharp sand is used instead of crushed stone. The pavements known in the market as granolithic and flintolithic have crushed granite and flint chips respectively mixed with the cement. The base is composed of small dry, broken stone, etc., from 4″ to 8″ thick, rammed and packed solid; on this base Portland-cement concrete 2½″ thick is laid, composed of two parts stone to one part of mortar, which is to be one part cement and one part sand. The finishing coat to be 1½″ thick of clean, crushed stone-chips or clean, sharp sand and best English or German Portland cement, mixed in equal parts; to be laid in alternate blocks of from 2′ to 6′ square, with ¼″ indentations on the surface except at joints, which will have a smooth border 1½″ or 2″ wide. It is this blocking or lining off the pavements which Schillinger claims his patent covers, but which is not yet decided by the courts.

Macadamized Roadways. — The cheapest roadway laid by the Government is macadam, constructed of a layer from 8″ to 12″ thick of small, broken stone suitable for road-metal of a size to pass through a 2″-diameter ring and finished with coarse gravel properly crowned and rolled. The walks not used for driveways should have a layer of coarse sand about 1″ thick on top of gravel. The writer has seen some very excellent macadamized roads made of broken limestone without any gravel or sand; in a few years the wear of usage, assisted by the action of the weather, has made a solid and compact bed almost like a mass of concrete, with few, if any, loose stones. Streets of this description may be seen in the towns of Lexington, Va., and Paducah, Ky.

Belgian-block Pavement. — The bed of roadway to be built of 4″ of gravel or broken stone (this first bed is frequently omitted) on top of this is placed 4″ of sand. The blocks to be hard and durable granite or limestone from 6″ to 12″ long, 3″ to 5″ wide and 6″ deep, to be close-jointed with projections of not over ½,″ and to be laid at right angles to line of roadway, and each block to be thoroughly rammed and bedded; each course to be of blocks of uniform width, and so laid that all longitudinal joints shall be broken by a lap of at least 2″. The pavement to be properly crowned and graded, and to have depressions forming gutters at curbs.

The entire pavement is to have all the joints thoroughly filled with clean, hot gravel, and the blocks carefully rammed to a firm unyielding bed. The joints to be filled with the melted residuum of coal-tar of the proper consistency heated to 300° Fahrenheit, and poured into the joints while the gravel is still hot, until they will receive no more; the whole is then to be covered with sand, and when the tar is hard and dry the sand to be swept off.

Cobble-stone Pavement. — This pavement should have a 4″ bed of sand, the stones are irregularly shaped boulders, but should have an average depth of from 4″ to 6″, and not exceed 6″ on the face, they should be crowned higher than other pavements and have gutters against curbs, the sides formed of cobble-stones and the centre about 8″ wide of hard paving-bricks set on edge. The interstices between the stones to be filled with fine gravel, and the whole covered with sand and left until it thoroughly works in. It is best not to remove the sand until after a good rain.

Gutters. — All roadways, drives and walks should have gutters built against the curbing, at each side where practicable, properly connected to iron or tile-drains carrying the water off; where the pipes are likely to become clogged with refuse, the outlets to be properly protected by gratings or wire screens.

Gutters for macadamized or cobble-stone pavements are frequently built of brick laid flat or on edge on a bed of concrete or sand. All gutters should have the joints fully grouted with tar, asphalt, or liquid cement.

Curbing. — All sidewalks are to have a stone-curbing separating them from the roadway and drives, and there must also be a curbing between the grass and sidewalks, drives and walks, with gutters to prevent water from grass flowing across same.

The cheapest kind of curbing is of bricks set on end, which should be in perfect line, and have no projection above the sod on one side or the walk on the other, depending upon the purpose for which it is wanted. Stone-curbing may be of granite, limestone or

[1] Continued from No. 268, page 623.

blue-stone, and seldom of freestone or sandstone, it should extend deep enough in the ground to avoid all danger of dislocation by frost. If of blue-stone it is usually made 4″ thick, and if of granite or limestone from 6″ to 10″ thick, and in as long lengths as practicable; to be properly rounded at corners, and all exposed surfaces to be dressed smooth, rubbed, square-drove, or tooled-worked for soft stone and pean-hammered, or No. 6 cut for granite; the top surfaces to be bevelled to conform to grade of sidewalk. The curbing to be set in perfect alignment, and to the required grades.

MEASUREMENT.

Stone flagging and artificial-stone pavements are usually measured and estimated by the square foot; all other pavements, roadways, etc., by the square yard; the actual net surface after laying is to be measured.

Gutters are estimated by the lineal foot, giving description as to materials and construction; and curbing also by the lineal foot, giving kind of stone and dimensions, with quantity of face-dressing necessary.

COST.

The prices given per unit are for the completed work, including excavating and base unless otherwise stated.

The cost of stone flagging is dependent entirely upon the locality and the kind of stone.

Granite at St. Louis, 10″ thick, cost, per square foot	$1.00
" " Augusta, Me., 6″ rough, cost, per square foot	.30
Limestone at Jackson, Tenn., 4″ thick, cost, per square foot	.45 to .50
" " " " 6″ " " " " "	.60

The cost of artificial stone, concrete and asphalt depends upon the locality, as to tools, implements, etc., being convenient for the work.

Artificial Stone (Gravel), at Poughkeepsie, N. Y., cost, per sq. ft.	$.18
" " (Crushed Stone), at Poughkeepsie, N. Y., cost, per sq. ft.	.28
" " (Granolithic), " " " " " "	.35
" " " " Greensboro', N. C., " " "	.34
" " " " Jackson, Tenn., " " "	.35
" " " " Memphis, Tenn., " " "	.48

The cost of excavating and base must be added to the following prices per square foot, which are for the facing only.

Asphalt facing, ¾″ thick, at Philadelphia, cost	$ .09
" " 1½″ " " " "	.14
Mastic " 1″ " " Cincinnati, "	.10
" (Seyssel), 1″ " " Philadelphia, "	.22
" (Vohwohlen), 1″ thick, at Philadelphia, cost	.11 to .13
" (Neufchatel), 1″ " " " "	.25
Concrete and asphalt, 8½″ thick, streets in Washington, cost, per sq. yd.	2.30
Concrete and asphalt, 6″ thick, streets in San Francisco, cost, per sq. yd.	1.80
Concrete, composed of small stones, sand, an tar, at Concord, N. H., cost, laid hot 3″ thick, per sq. yd.	.60
Concrete, composed of small stones, sand, and tar, at Concord, N. H., cost, laid cold, 3″ thick, per sq. yd.	.45
Concrete, composed of small stones, sand, and tar, at Concord, N. H., cost, laid hot 5″ thick, per sq. yd.	.75
Brick-paving costs, per square yard	.75 to 1.00
Double layer of brick and cement costs, per sq. yd.	1.80 to 2.00
Macadamizing, 8″ to 10″ thick, costs, per sq. yd. (depending on the nearness of the stone)	.35 to .50
Cobble-stone pavement costs, per sq. yd.	.60 to .75
Belgian-block pavement " " "	2.75 to 3.50
Limestone blocks at Terre Haute costs, per sq. yd.	2.70
Granite blocks at Philadelphia " " "	2.78
" " " St. Louis " " "	3.50

Gutters cost about the same as the above materials with a slight addition for shaping them.

Curbing for sidewalks, etc., costs, per lineal foot	$ .75 to 2.25
Limestone curb, 6″ × 2′, at Kansas City, cost	.78
" " 6″ × 2′ 6″, at Jackson, Tenn., cost	1.50
" " 6″ × 3′ " " " "	2.25
Granite " 8″ × 3′ " New Orleans, "	2.00
Bluestone " 4″ × 20″ " Concord, N. H., "	.45

JAS. E. BLACKWELL.

[To be continued.]

THE ILLUSTRATIONS

[*Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.*]

LEIF ERICSON. BOSTON, MASS. ANNE WHITNEY, SCULPTOR.

[Gelatine Print, issued only with the Imperial Edition.]

THIS statue, slightly more than life size, cast in bronze and supported on a red sandstone pedestal near the entrance to the new park was unveiled, October 29, 1887. The inscription

LEIF,
THE DISCOVERER,
SON OF ERICK,
WHO SAILED FROM ICELAND
AND LANDED ON THIS CONTINENT
A. D. 1000

gives a brief explanation of its presence.

CONSTRUCTION OF FLOORS IN A FLOUR WAREHOUSE, PHILADELPHIA, PA. MR. W. R. POWELL, ARCHITECT, PHILADELPHIA, PA.

SEE Mr. Powell's letter elsewhere in this issue.

SKETCH OF HOUSE FOR T. E. JONES, ESQ. MR. E. G. W. DIETRICH, ARCHITECT, NEW YORK, N. Y.

DESIGN FOR A CITY FRONT. MR. E. R. TILTON, ARCHITECT, NEW YORK, N. Y.

MANTELPIECE. MR. J. R. RHIND, ARCHITECT, MONTREAL, CAN.

CLOISTER OF SANTO DOMINGO, SALAMANCA, SPAIN.

THE TAYLOE MANSION. THE OCTAGON HOUSE, WASHINGTON, D. C.

BISHOP MEAD, in his "*Old Churches, Ministers and Families of Virginia,*" tells us that William Tayloe emigrated from London to Virginia in 1650. John Tayloe, his son, who was a member of the House of Burgesses, founded the noted estate of Mount Airy, Virginia. He had twelve children, one of whom, Col. John Tayloe, built the old Octagon House. The Tayloes intermarried with the Corbins, the Lees, the Washingtons, the Carters, the Pages and nearly every other prominent family of Virginia. The mother of Col. John Tayloe, of the Octagon, was a daughter of Governor Plater of Maryland, and his wife was Anne, daughter of Benjamin Ogle, Governor of Maryland.

For those days, Col. John Tayloe (commissioned by Washington in the Revolution) was a very wealthy man, having at the age of twenty an income of nearly sixty thousand dollars a year, and when the Octagon was built he had an income of seventy-five thousand a year. His eldest son, John, was in the Navy and was distinguished in the battles of the "*Constitution*" with the "*Guerriere,*" and the "*Cyane*" in the Levant.

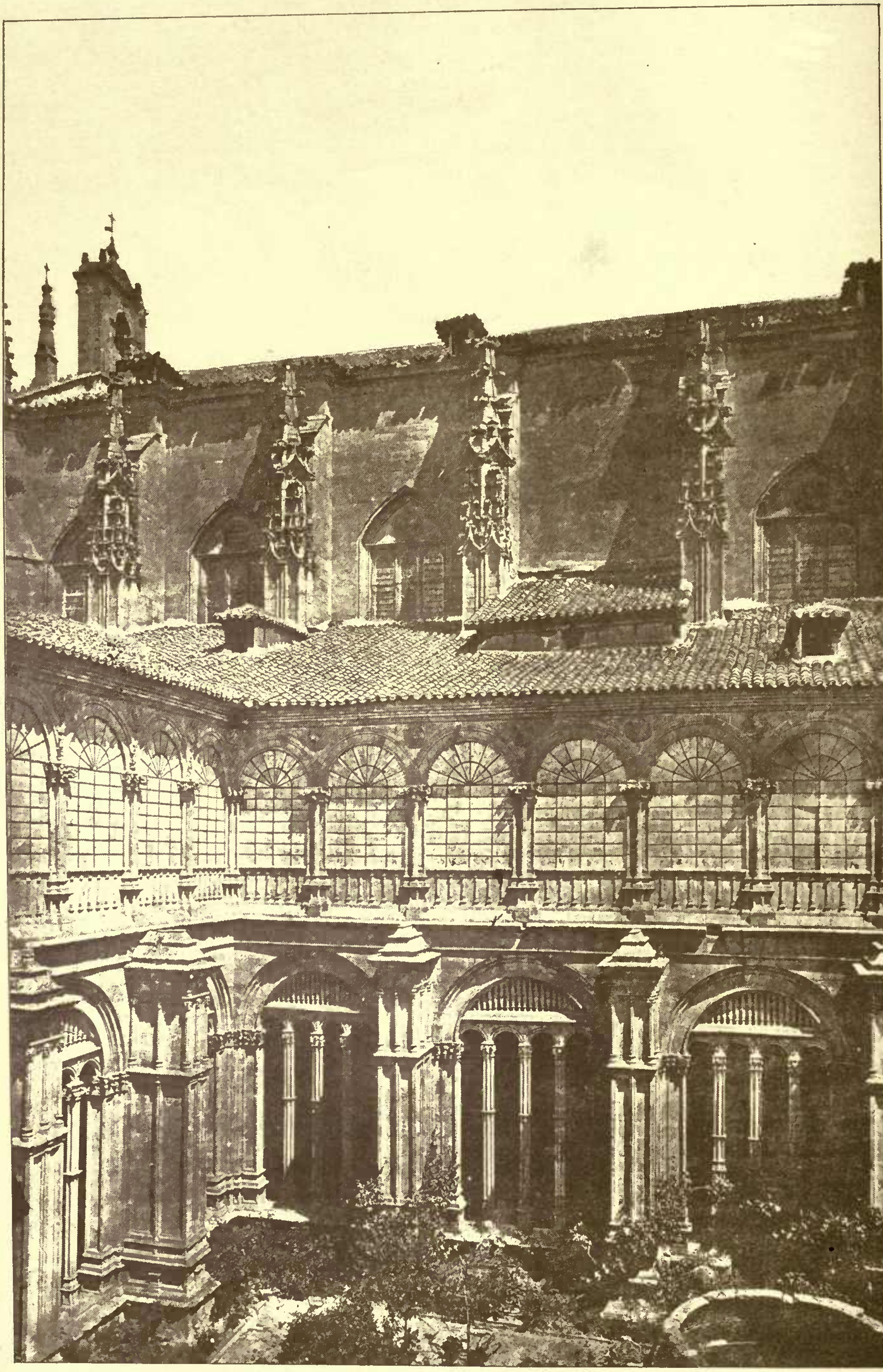
The memoirs of Benjamin Ogle Tayloe state that Colonel Tayloe was an intimate friend of General Washington, and it was on the advice of the General that the Octagon was built in Washington City, Colonel Tayloe having previously determined to build his winter residence in Philadelphia.

The house was commenced in 1798 and was completed in 1800. During the process of erection, General Washington visited this building, as he took a lively interest in it, being the home of his friend and one of the most superior residences in the country at the time. After the war of 1812, the British having burned the White House, James Madison occupied the Octagon for some time and during his occupancy the Treaty of Ghent between the United States and Great Britain was signed by him in February, 1815, in the circular room over the vestibule, shown on the plan in illustrated plate.

At this period Colonel Tayloe was distinguished for the unrivalled splendor of his household and equipages, and his establishment was renowned throughout the country for its entertainments, which were given in a most generous manner to all persons of distinction who visited Washington in those days, both citizens and foreigners. In this list would be included such names as Jefferson (Washington had passed away before its completion), Madison, Monroe, J. Q. Adams, Decatur, Porter, Webster, Clay, Calhoun, Randolph, Lafayette, Steuben and Sir Edward Thornton, British Minister and father of the recent British Minister, and many others of less distinction than the ones named. Colonel Tayloe died in 1828 and his death to a certain extent terminated the splendid hospitalities of the Octagon, which had covered a period of nearly thirty years.

This house is well built of brick, trimmed with Aquia Creek sandstone. The lot is triangular in form and fenced in by a high brick wall. The kitchen, stable and out-houses are built of brick for the accommodation of servants and horses, Colonel Tayloe being a noted turfman and keeping many fine running horses. The building and walls conform accurately to the street lines, showing that the streets were accurately laid off even at that early day. The interior is elaborately finished, the doors and shutters being of mahogany and all still in an excellent state of preservation. All the work in the circular vestibule coincides with the circumference of the tower, the doors, sash and glass being made on the circle, and all are still in working order. The parlor mantel, illustrated on plate, is made of a fine cement composition and is painted white. The remains of gold-leaf show in some of the relieved portions. The figures are excellent, evidently having been modelled by some good artist. The mantel in the bed-room is of wood, the ornamentation being putty stucco. From the work of Bielefeld on papier-maché, I learn that the different methods of making the plastic ornaments at that date was putty, commonly used on mantels or flat work, where they were not carved in the wood, (this is the material with which most of our Colonial work is ornamented) papier-maché, carton-pierre, cement and plaster. Carton-pierre was a composition of whiting, oil and paper and was hard and easily polished, and I am inclined to the opinion that the parlor and dining-room mantel in the Tayloe House is of this material. The oldest cabinet-makers, and I have interviewed many of them in this section of the country, are entirely ignorant as to the method or composition of such ornaments, and books, with the exception of the one mentioned above, seem to have ignored the subject. Leading into the back hall and dining-room are two secret doors, in which the wash-boards, chair-boards, etc., run across the door, being ingeniously cut some distance from the actual door, no key-holes, hinges or openings showing on the blind side. The knobs and shutter-buttons are of brass and of the pattern shown in the sketch. The roof has three rather peculiar trusses of

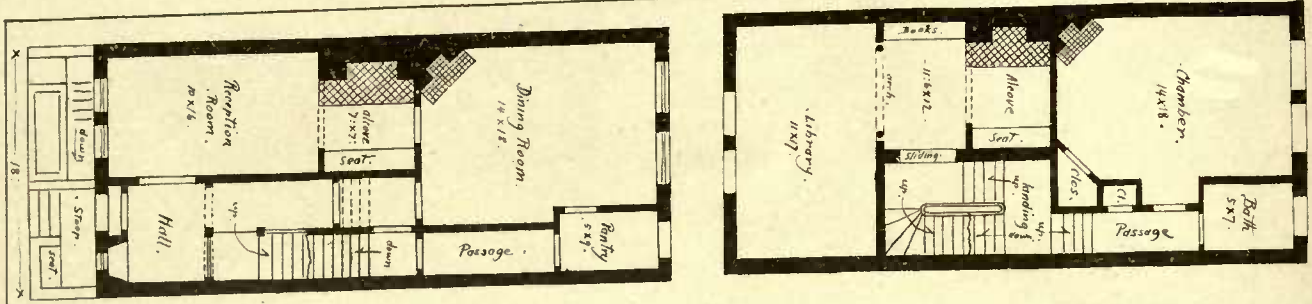
COPYRIGHT 1888 BY TICKNOR & CO

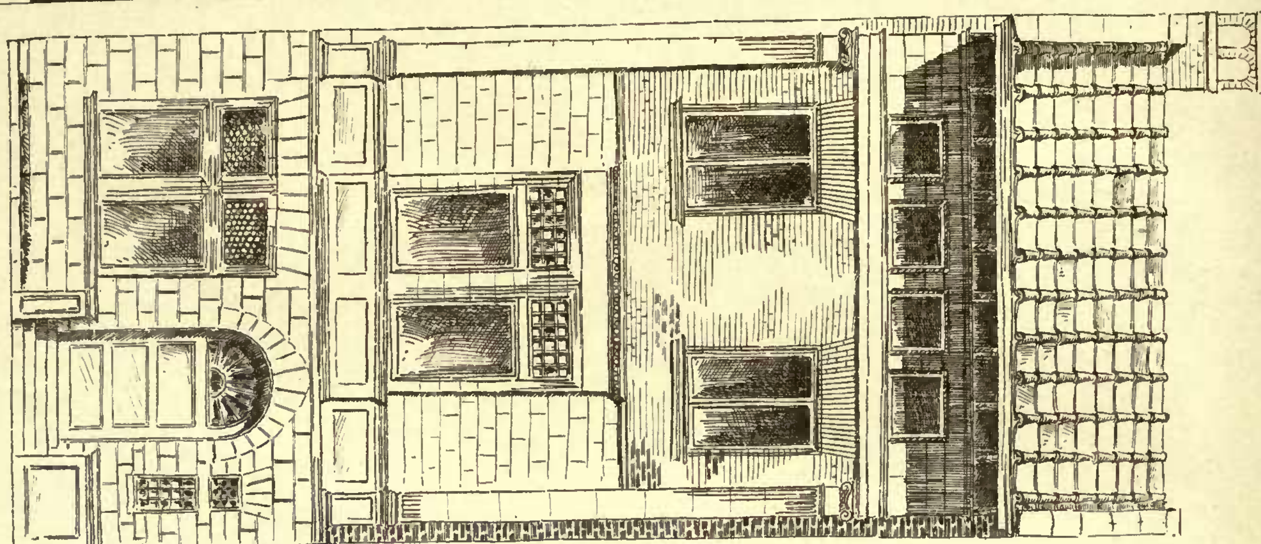


Heliotype Printing Co. Boston.

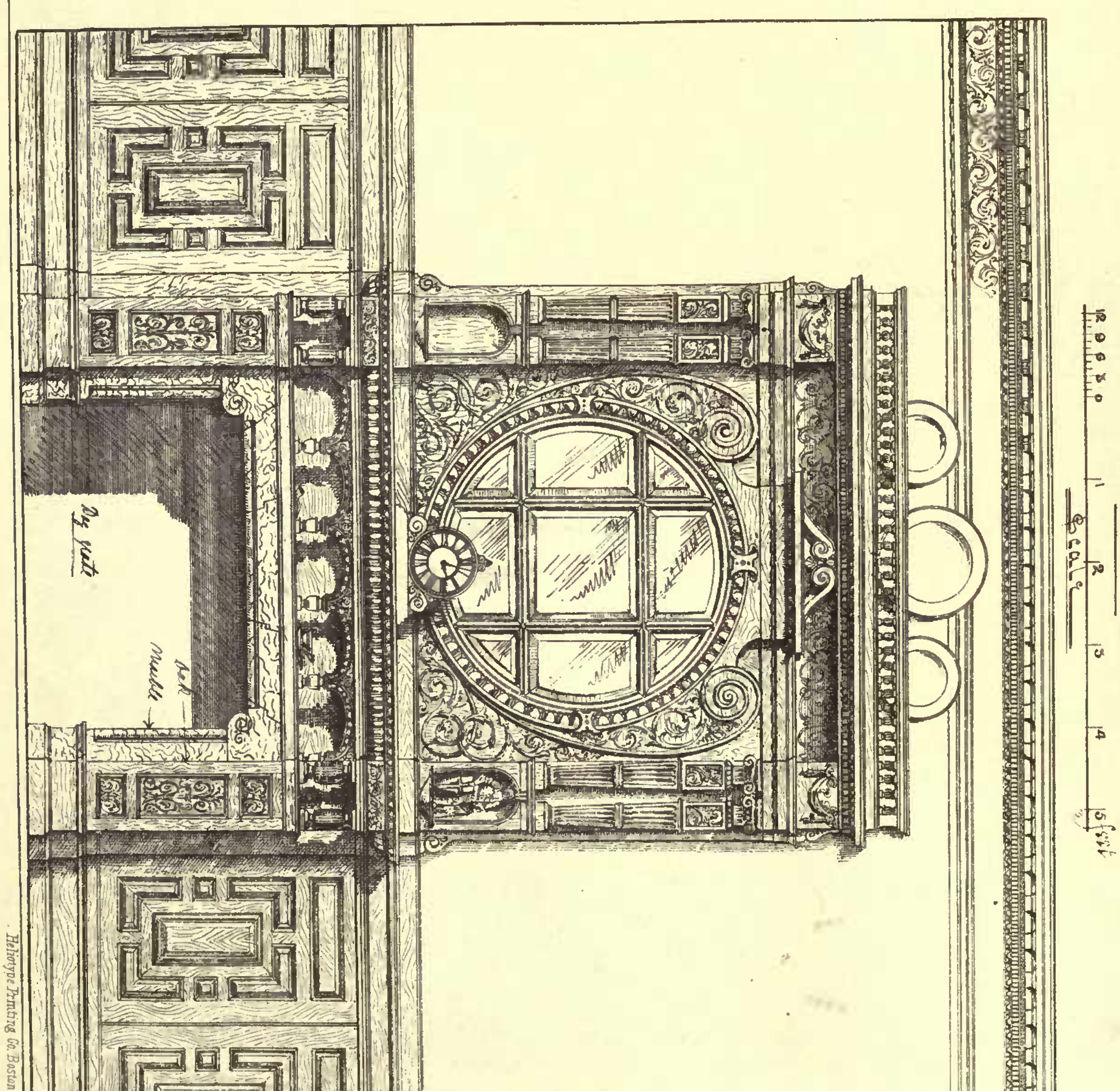
Cloister of San Domingo Salamanca Spain.

COPYRIGHT 1888 BY TICKNOR & Co.





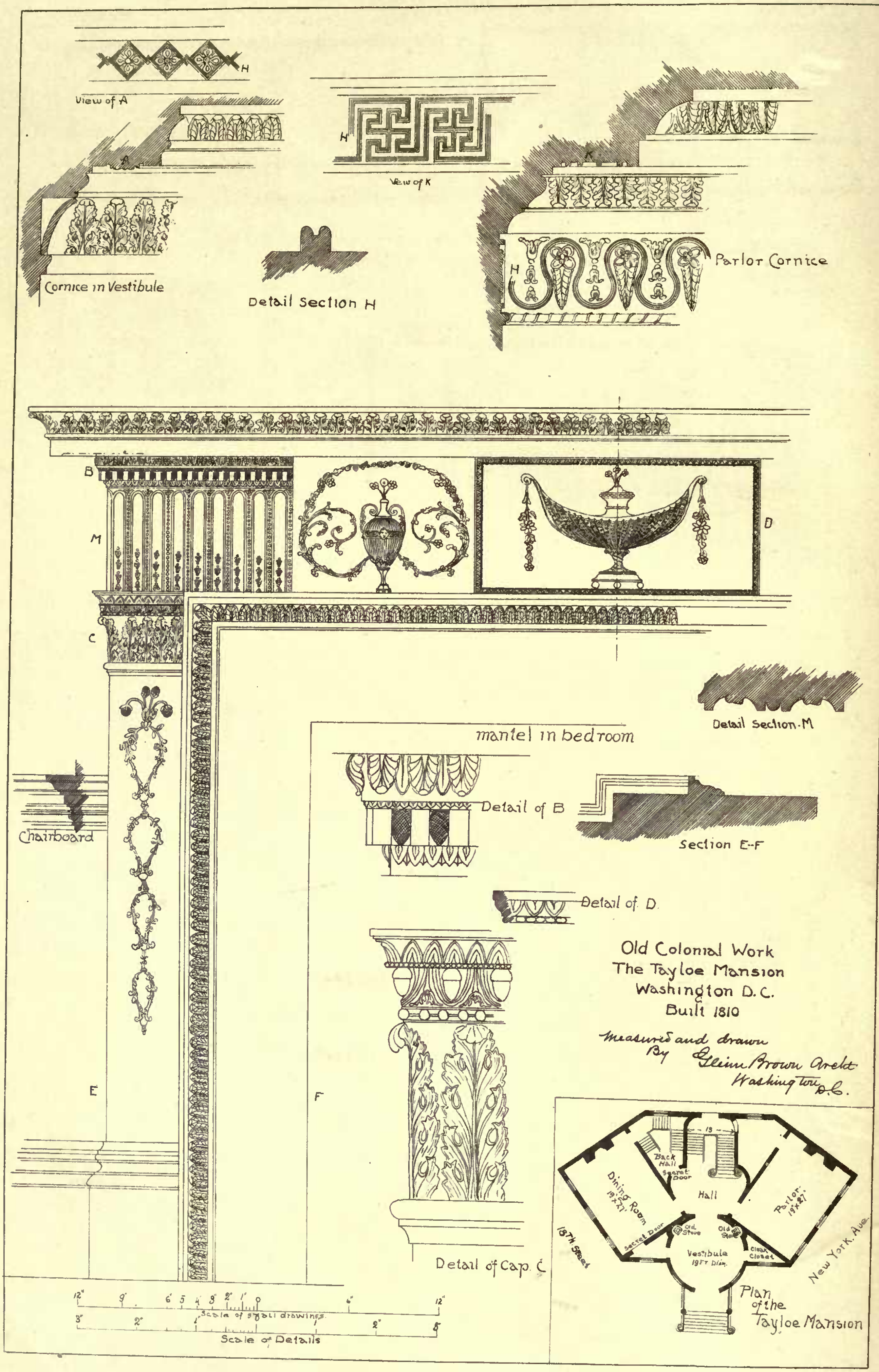
CITY FRONT — E.R. TILTON, ARCHT.



MANTLE PIECE
JAMES R. RHIND, ARCHT.
MONTREAL

Heliotype Printing Co. Boston.

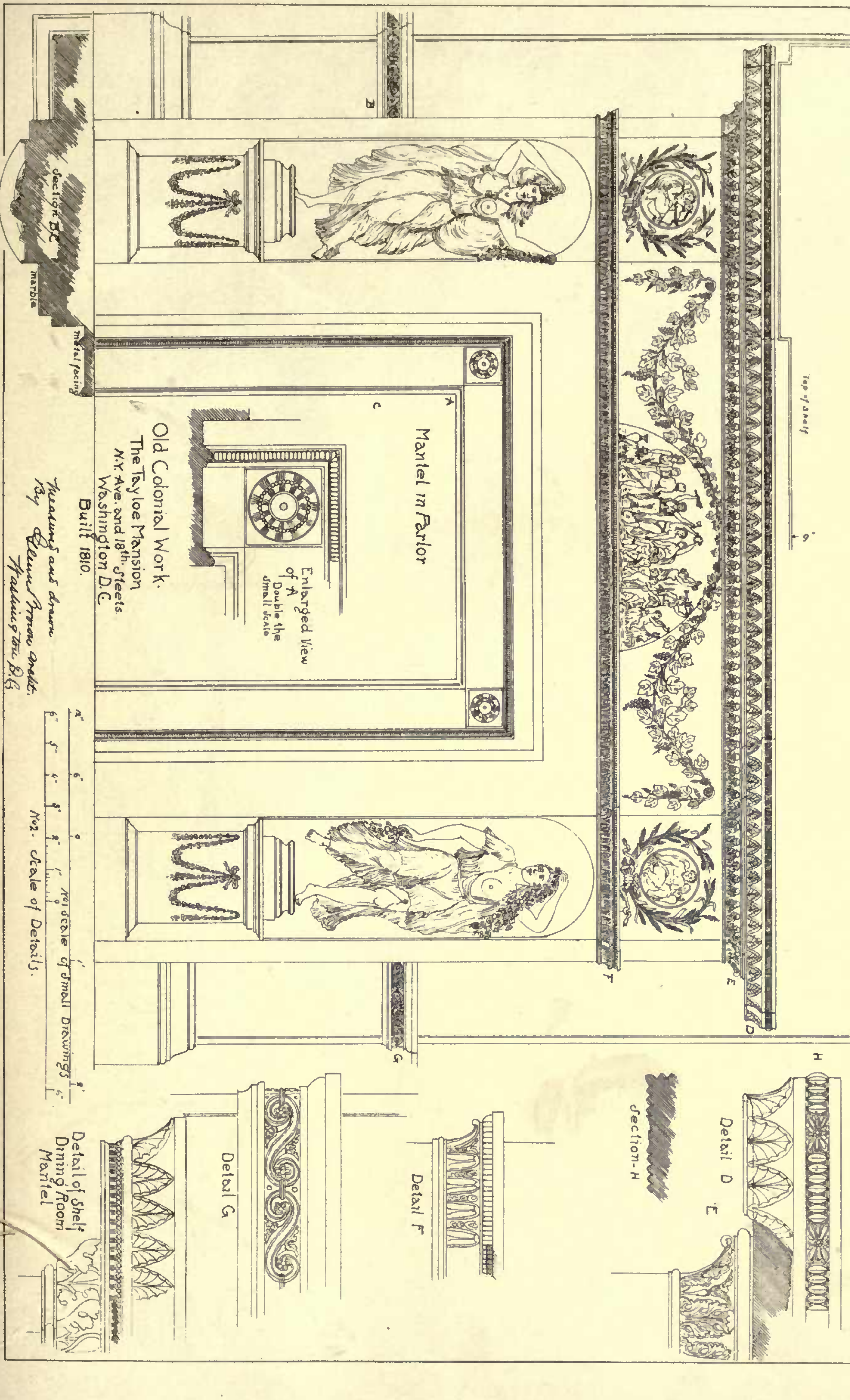
COPYRIGHT 1888 BY TICKNOR & Co



Heliotype Printing Co. Boston.

· · OLD · COLONIAL · WORK · IN · THE · SOUTH ·

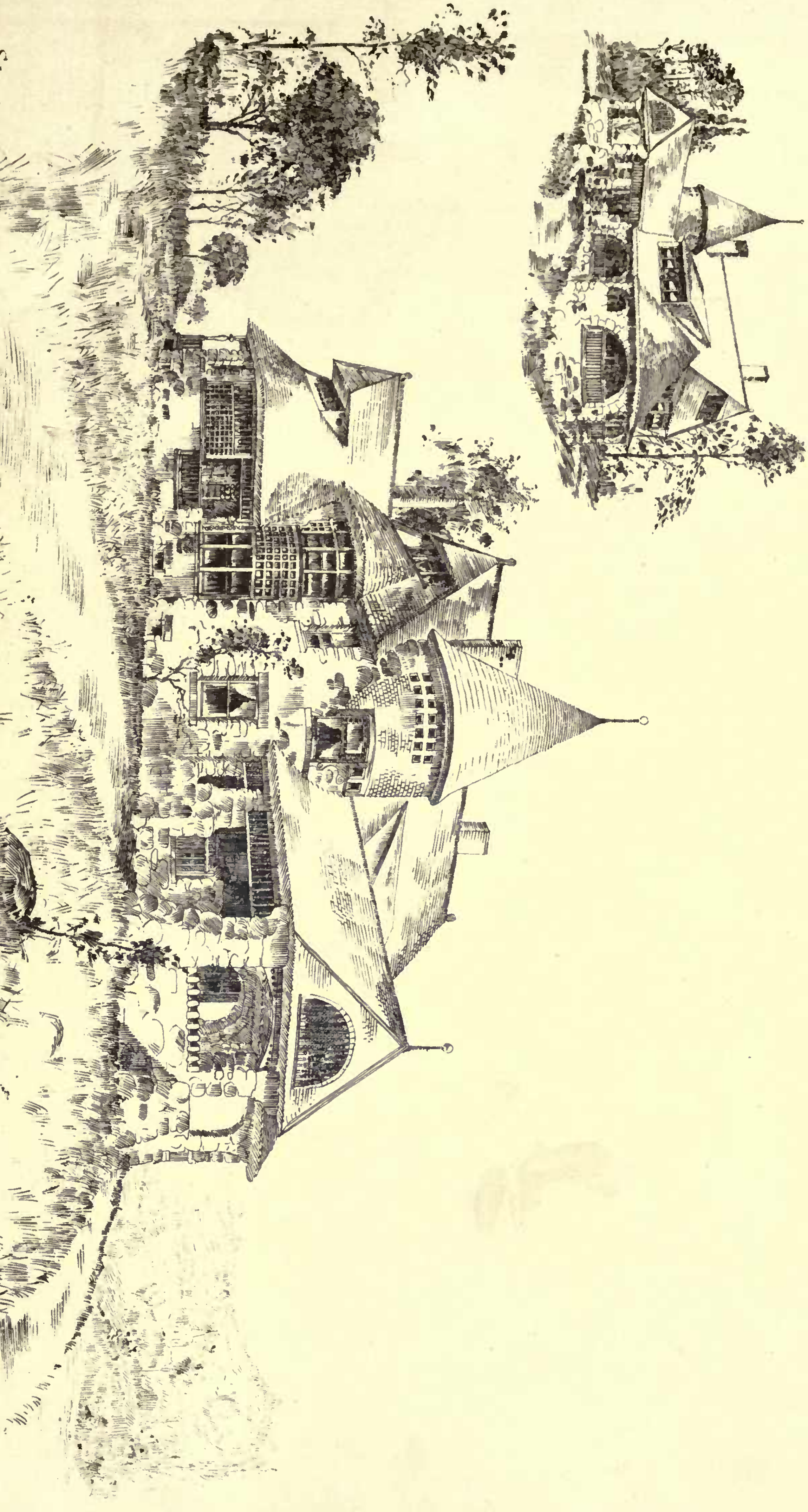
COPYRIGHT 1888 BY TICKNOR & CO



· OLD · COLONIAL · WORK · IN · THE · SOUTH ·

Heliotype Printing Co. Boston

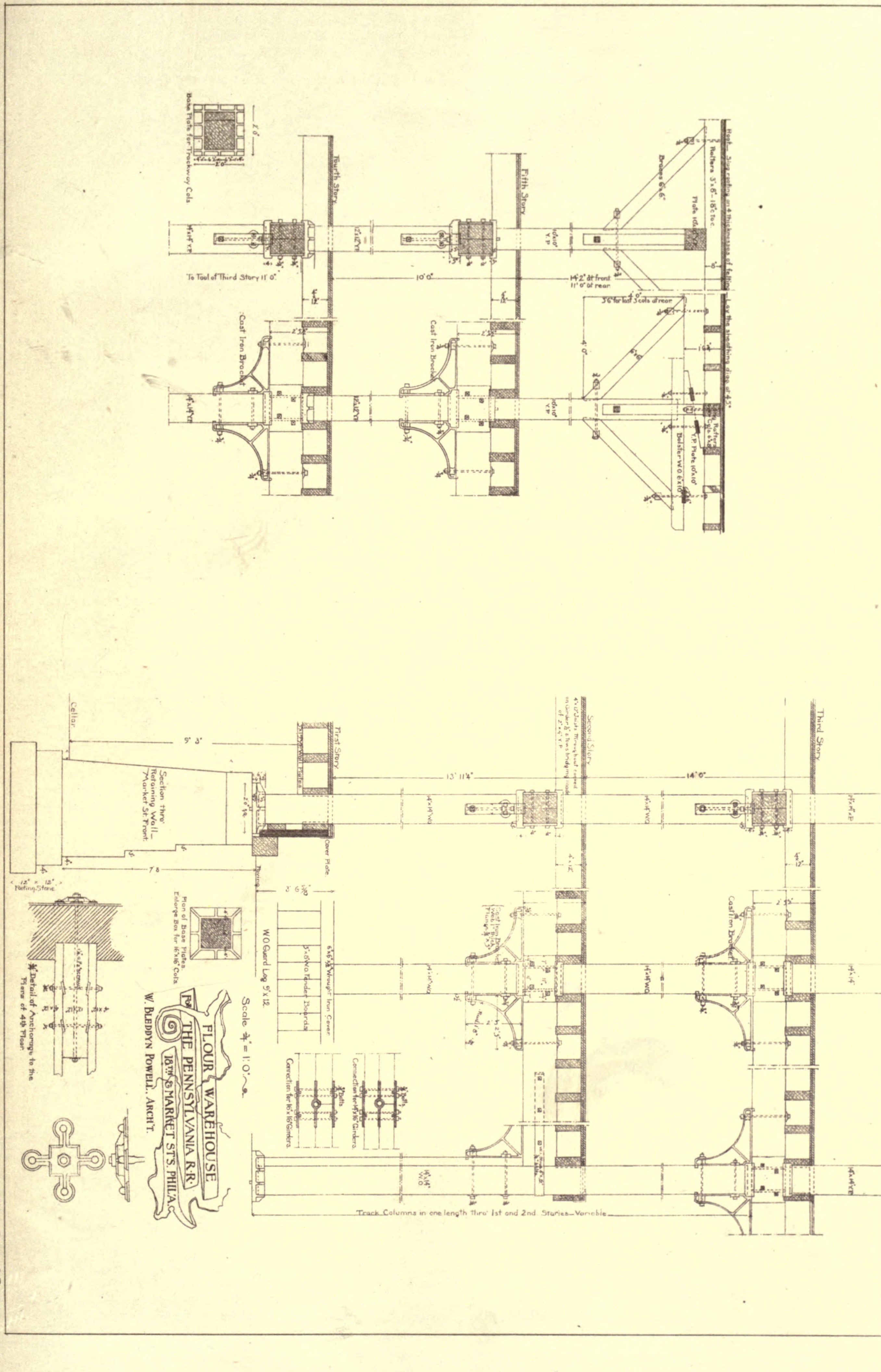
COPYRIGHT 1888 BY TICKNOR & CO



Sketch of Mr T E Jones' Residence.
E. G. W. Dietrich, Architect.
294. Broadway, New York.

Heliotype Printing Co. Boston.

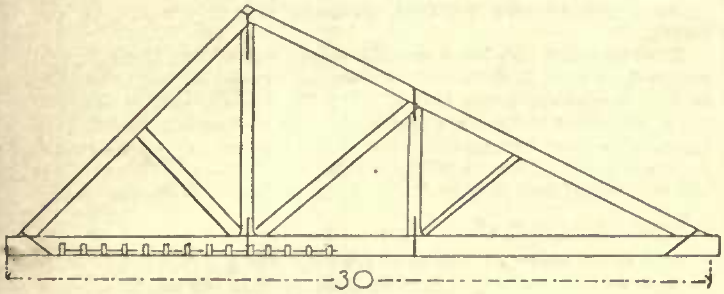
COPYRIGHT 1888 BY TICKNOR & Co.



Heliotype Printing Co. Boston.

the shape shown in the sketch, that and all timbers visible being hewn. Two old cast-iron wood-stoves still stand in the niches prepared for them in the vestibule. There is an old negro living whose duty it was to keep them supplied with fuel.

Dr. William Thornton was the architect. Dr. Thornton was a



Truss in Roof of The Octagon.

very interesting character and is deserving of a separate article. I hope at some time to be able to put the matter I have in shape for publication.

GLENN BROWN.

SAFE BUILDING.—XXI.[1]

FLOOR BEAMS AND GIRDERS.

Moment of Inertia. THE writer has so often been asked for more information as to the meaning of the term *Moment of Inertia* that a few more words on this subject may not be out of place.

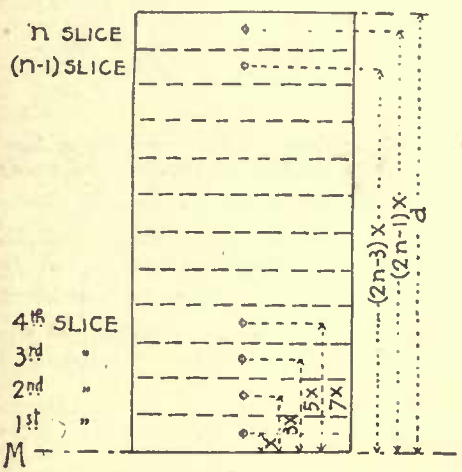


Fig. 119.

All matter, if once set in motion, will continue in motion unless stopped by gravity, resistance of the atmosphere, friction or some other force; similarly, matter, if once at rest, will so remain unless started into motion by some external force. Formerly it was believed, however, that all matter had a certain repugnance to being moved, which had to be first overcome, before a body could be moved. Probably in connection with some such theory the term arose.

In reality matter is perfectly indifferent whether it be in motion or in a state of rest, and this indifference is termed "Inertia." As used to-day, however, the term Moment of Inertia is simply a symbol or name for a certain part of the formula by which is calculated the force necessary to move a body around a certain axis with a given velocity in a certain space of time; or, what amounts to the same thing, the resistance necessary to stop a body so moving.

In making the above calculation the "sum of the product of the weight of each particle of the body into the square of its distance from the axis" has to be taken into consideration, and is part of the formula; and, as this sum will, of course, vary as the size of the body varies, or as the location or direction of the axis varies, it would be difficult to express it so as to cover every case, and therefore it is called the "Moment of Inertia." Hence the general law or formula given covers every case, as it contains the Moment of Inertia, which varies, and has to be calculated for each case from the known size and weight of the body and the location and direction of the axis.

In plane figures, which, of course, have no thickness or weight, the *area* of each particle is taken in place of its weight; hence in all plane figures the Moment of Inertia is equal to the "sum of the products of the area of each particle of the figure multiplied by the square of its distance from the axis."

Calculation of Moment of Inertia. Thus if we had a rectangular figure (119) b inches wide and d inches deep revolving around an axis M–N, we would divide it into many thin slices of equal height, say n slices each of a height $= 2.\ X$.

The distance of the centre of gravity of the first slice from the axis M–N will, of course be $= \frac{1}{2}.\ 2.\ X. = 1.\ X$

The distance of the centre of gravity of the second slice will be $= 3.\ X$,

that of the third slice will be $= 5.\ X$,
that of the fourth slice will be $= 7.\ X$,
that of the last slice but one will be $= (2\ n - 3).\ X$.
and that of the last slice will be $= (2\ n - 1).\ X$

The area of each slice will, of course, be $= 2.\ X.\ b$; therefore the Moment of Inertia of the whole section around the axis M–N will be (see No. 536, p. 163),

$$i = 2.\ X.\ b.\ (1.\ X)^2 + 2.\ X.\ b.\ (3.\ X)^2 + 2.\ X.\ b.\ (5.\ X)^2 + 2.\ X.\ b.\ (7.\ X)^2 + \text{etc.} \ldots\ldots + 2.\ X.\ b.\ [(2n-3).X]^2\ 2.\ X.\ b.[(2n-1).X]^2 \text{ or,}$$

$$i = 2.X.^3 b.\ [1^2 + 3^2 + 5^2 + 7^2 + \text{etc.} \ldots\ldots + (2n-3)^2 + (2n-1)^2]$$

now the larger n is, that is the thinner we make our slices, the nearer will the above approximate:

$$i = 2.\ X^3.\ b.\ \left[\frac{4}{3}.\ n^3\right]$$

$$= 8.\ X^3.\ n^3.\ \frac{b}{3}$$

Therefore, as: $2.\ X.\ n = d$ we have, by cubing,

$8.\ X^3.\ n^3 = d^3$; inserting this in above, we have:

$$i = \frac{d^3.\ b.}{3} \text{ or } \frac{b.\ d^3}{3}$$

The same value as given for i in Table I, section No. 29. Of course it would be very tedious to calculate the Moment of Inertia in every case; besides, unless the slices were assumed to be very thin, the result would be inaccurate; the writer has therefore given in Table I, the exact Moments of Inertia of every section likely to arise in practice.

Moment of Resistance. The Moment of Inertia applies to the whole section, the "Moment of Resistance," however, applies only to each individual fibre, and varies for each; it being equal to the Moment of Inertia of the whole section divided by the distance of the fibre from the axis.

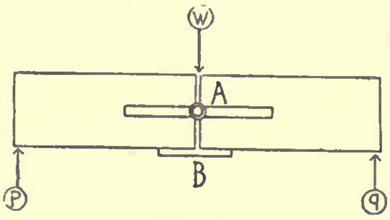


Fig. 120.

Now to show the connection of the Moments of Inertia and Resistance with transverse strains, let us consider the effect of a weight on a beam (supported at both ends).

If we consider the beam as cut in two and hinged at the point A (where the weight is applied), Fig. 120; further, if we consider a piece of rubber nailed to the bottom of each side of the beam, it is evident that the effect of the weight will be, as per Fig. 121.

Effect of load on beam. Examining this closer we find that the corners of the beams above A (or their fibres) will crush each other, while those below A, are separated farther from each other, and the piece of rubber at B greatly stretched. It is evident, therefore, that the fibres nearest A experience the least change, and

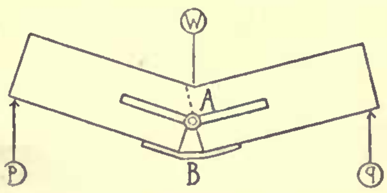


Fig. 121.

[1] Continued from page 266, No. 623.

GLOSSARY OF SYMBOLS.—The following letters, *in all cases*, will be found to express the same meaning, *unless distinctly otherwise stated*, viz.: —

a = *area*, in square inches.
b = *breadth*, in inches.
c = constant for *ultimate resistance to compression*, in pounds, per square inch.
d = *depth*, in inches.
e = constant for *modulus of elasticity*, in pounds-inch, that is, pounds per square inch.
f = *factor-of-safety*.
g = constant for *ultimate resistance to shearing*, per square inch, across the grain.
g_1 = constant for *ultimate resistance to shearing*, per square inch, lengthwise of the grain.
h = *height*, in inches.
i = *moment of inertia*, in inches. [See Table I.]
k = *ultimate modulus of rupture*, in pounds, per square inch.
l = *length*, in inches.
m = *moment* or *bending moment*, in pounds-inch.
n = *constant* in Rankine's formula for compression of long pillars. [See Table I.]
o = the *centre*.
p = the *amount* of the *left-hand re-action* (or support) of beams, in pounds.
q = the *amount* of the *right hand re-action* (or support) of beams, in pounds.
r = *moment of resistance*, in inches. [See Table I.]
s = *strain*, in pounds.
t = constant for *ultimate resistance to tension*, in pounds, per square inch.
u = *uniform load*, in pounds.
v = *stress*, in pounds.
w = *load at centre*, in pounds.
x, y and z signify *unknown quantities*, either in pounds or inches.
δ = *total deflection*, in inches.
ρ^2 = *square of the radius of gyration*, in inches. [See Table I.]
𝔡 = *diameter*, in inches.
𝔯 = *radius*, in inches.
π = 3.14159, or, say, 3 1-7 signifies the *ratio of the circumference and diameter of a circle*.

If there are more than one of each kind, the second, third, etc., are indicated with the Roman numerals, as, for instance, a, a_{I}, a_{II}, a_{III}, etc., or b, b_{I}, b_{II}, b_{III}, etc.

In taking moments, or bending moments, strains, stresses, etc., to signify at what point they are taken, the letter signifying that point is added, as, for instance: —

m = moment or bending moment at *centre*.
m_A = " " " *point A*.
m_B = " " " *point B*.
m_X = " " " *point X*.
s = strain at *centre*.
s_B = " *point B*.
s_X = " *point X*.
v = stress at *centre*.
r_D = " *point D*.
r_X = " *point X*.
w = load at *centre*.
w_A = " *point A*.

that the amount of change of all the fibres is directly proportionate to their distance from A (as the length of all lines drawn parallel to the base of a triangle, are proportionate to their distance from the axis); further, that the fibres at A experience no change whatever. Now, if instead of considering the effect of a load on a hinged beam we

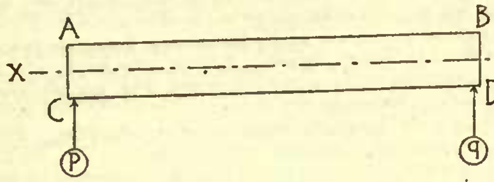


Fig. 122.

took an unbroken beam, the effect would be similar, but, instead of being concentrated at one point, it would be distributed along the entire beam; thus the beam A B D C (Fig. 122) which is not loaded. becomes when loaded, the slightly curved beam (A B D C) Fig. 123. It is evident that the fibres along the upper edge are compressed or A B is shorter than before; on the other hand the fibres along C D are elongated or in tension,

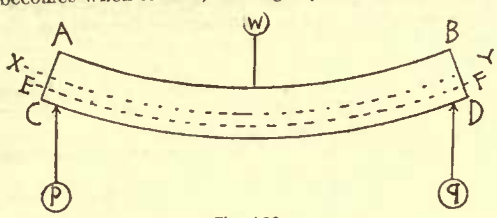


Fig. 123.

and C D is longer than before; if we now take any other layer of fibres as E F, they—being below the neutral (and central)[1] axis X–Y—are evidently elongated; but not so much so, as C D: and a little thought will clearly show that their elongation is proportioned to the elongation of the fibres C D, directly as their respective distances from the neutral axis X–Y. It is further evident that the neutral axis X–Y is the same length as before, or its fibres are not strained; it is, therefore, at this point that the strain changes from one of tension to one of compression.

In Fig. 124 we have an isometrical view of a loaded beam.

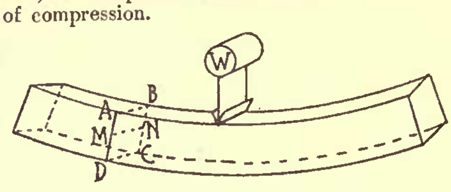


Fig. 124.

Rotation around neutral axis. Let us now consider an infinitesimally thin (cross) section of fibres A B C D in reference to their own neutral axis M–N. It is evident that if we were to double the load on the beam, so as to bend it still more, that the fibres along A B would be compressed towards or would *move* towards the centre of the beam; the fibres along D C on the contrary would be elongated or would *move* away from the centre of the beam.

The fibres along M–N, being neither stretched nor compressed, would remain stationary.

The fibres between M–N and A B would all move towards the centre of the beam, the amount of motion being proportionate to their distance from M–N; the fibres between M–N and D C on the contrary would move away from the centre of the beam the amount of motion being proportionate to their distance from M–N; a little thought, therefore, shows clearly that the section A B C D turns or rotates on its neutral axis M–N, whenever additional weight is imposed on the beam.

This is why we consider in the calculations the moment of *Inertia* or the amount of resistance of a *cross-section* as *rotating* on its neutral axis.

Now let us take the additional weight off the beam and it will spring back to its former shape, and, of course, the fibres of the infinitesimally thin section A B C D will resume their normal shape; that is, those that were compressed will stretch themselves again, while those that were stretched will compress themselves back to their former shape and position, and those along the neutral axis will remain constant; or, in other words, this thin layer of fibres A B C D can be considered as a double wedge-shaped figure A B A_1 B_1 M N D C D_1 C_1 (Fig. 125) the base of the wedges becoming larger or smaller as the weight on the beam is varied.

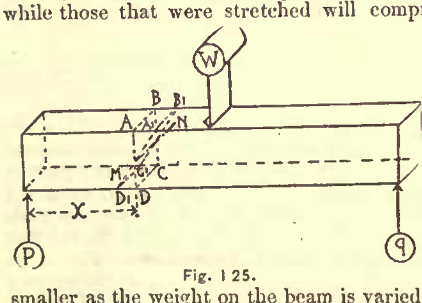


Fig. 125.

Resistance of Wedge. Now to proceed to the calculation of the resistance of this wedge. It is evident that whatever may be the external strain on the beam at the section A B C D, the beam will owe whatever resistance it has at that point to the resistances of the fibres of the section or wedge to compression and tension.

Now considering the right-hand side of the beam as rigid, and the section A B C D as the point of fulcrum of the external forces, we have only one external force p, tending to turn the left-hand side of the beam upwards around the section A B C D, its total tendency, effect or moment m at A B C D, we know is $m = p.\,x$ (law of the lever).

Now to resist this we have the opposition of the fibres in the wedge A B A_1 B_1 M N to compression and the opposition to tension of the fibres in the wedge D C D_1 C_1 M N. For the sake of convenience, we will still consider these wedges, as wedges but so infinitesimally thin that we can safely put down the amount of their contents as equal to the area of their sides, so that—if A B $= b$ (the width of beam) and A D $= d$ (the depth of beam)—we can safely call *each* wedge as equal to $b.\,\frac{d}{2}$.

Now as the centre of gravity of a wedge is at $\frac{1}{3}$ of the height from its base, or $\frac{2}{3}$ of the height from its apex (and as the height of each wedge is $= \frac{d}{2}$) it would be $= \frac{2}{3}.\,\frac{d}{2} = \frac{d}{3}$ from axis M–N. The moment of a wedge at any axis M–N is equal to the contents of the wedge multiplied by the distance of its centre of gravity from the axis, the whole multiplied by the stress of the fibres, (that is their resistance to tension or compression). Now the contents of each wedge being $= b.\,\frac{d}{2}$, the distance of centre of gravity from M–N $= \frac{d}{3}$, and the stress being say $= s$, we have for the resistance of *each* wedge

$$= b.\,\frac{d}{2}.\,\frac{d}{3}.\,s$$

$$= \frac{b.\,d^2}{6}.\,s$$

Now if the stress on the fibres along the extreme upper or lower edges $= k$ (or the modulus of rupture), it is evident that the *average* stress on the fibres in either wedge will $= \frac{k}{2}$, or $s = \frac{k}{2}$ (for the stress on each fibre being directly proportionate to the distance from the neutral axis the stress on the average will be equal to half that on the base). Now inserting $\frac{k}{2}$ for s in the above formula, and multiplying also by 2, (as there are two wedges resisting), we have the total resistance to rupture or bending of the section A B C D (A_1 B_1 C_1 D_1)

$$= \frac{b.\,d^2}{6}.\,\frac{k}{2}.\,2$$

$$= \frac{b.\,d^2}{6}.\,k$$

Now, by reference to Table I, section No. 2, we find that $\frac{b.d^2}{6} =$ Moment of Resistance for the section A B C D; therefore, we have proved the rule, that when the beam is at the point of rupture at any point of its length the bending moment at that point is equal to the moment of resistance of its cross-section at said point multiplied by the modulus of rupture.

Where girders or beams are of wood, it becomes of the highest importance that they should be sound and perfectly dry. The former that they may have sufficient strength, the latter that they may resist decay for the longest period possible.

Formation of Wood. Every architect, therefore, should study thoroughly the different kinds of timber in use in his locality, so as to be able to distinguish their different qualities. The strength of wood depends, as we know, on the resistance of its fibres to separation. It stands to reason that the young or newly formed parts of a tree will offer less resistance than the older or more thoroughly set parts. The formation of wood in trees is in circular layers, around the entire tree, just inside of the bark. As a rule one layer of wood is formed every year, and these layers are known, therefore, as the "annular rings," which can be distinctly seen when the trunk is sawed across. These rings are formed by the (returning) sap, which, in the spring, flows upwards between the bark and wood, supplies the leaves, and returning in the fall is arrested in its altered state, between the bark and last annular ring of wood. Here it hardens, forming the new annular ring. As subsequent rings form around it, their tendency in hardening is to shrink or compress and harden still more the inner rings, which hardening (by compression) is also assisted by the shrinkage of the bark. In a sound tree, therefore, the strongest wood is at the heart or centre of growth. The heart, however, is rarely at the exact centre of the trunk, as the sap flows more freely on the side exposed to the effects of the sun and wind; and, of course, the rings on this side are thicker, thus leaving the heart constantly nearer to the unexposed side.

Heart-Wood. From the above it will be readily seen that timber should be selected from the region of the heart, or it should be what is known as "heart-wood." The outer layers should be rejected, as they are not only softer and weaker, but, being full of sap, are liable to rapid decay. To tell whether or no the timber is "heart-wood"

[1] As a rule the neutral axis can be safely assumed to be central, but it is not necessarily so. In materials, such as cast-iron, stone, etc., where the resistance of the fibres to compression and tension varies greatly, the axis will be far from the centre, near the weaker fibres.

one need but look at the end, and see whether it contains the centre of the rings. No bark should be allowed on timber, for not only has it no strength itself, but the more recent annular rings near it, are about as valueless.

Medullary Rays. In some timbers, notably oak, distinct rays are noticed, crossing the annular rings and radiating from the centre. These are the "medullary rays," and are elements of weakness. Care should be taken that they do not cross the end of the timber horizontally, as shown at A in Fig. 126, but as near vertically as possible, see B in Fig. 127. The beautiful appearance of quartered oak and other woods is obtained by cutting the planks so that their surfaces will show slanting cuts through these medullary rays.

Seasoning cracks. All timber cracks more or less in seasoning, nor need these cracks cause much worry, unless they are very deep and long. They are, to a certain extent, signs of the amount of seasoning the timber has had. They should be avoided, as much as possible, near the centre of the timber, if regularly loaded, or near the point of greatest bending moment, where the loads are irregular. If timber without serious cracks cannot be obtained, allowance should be made for these, by increasing its size.

Fig. 126.

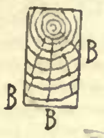


Fig. 127.

Fig. 128.

Fig. 129.

Fig. 130.

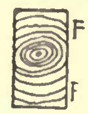


Fig. 131.

Vertical, or nearly vertical cracks (as C, Fig. 128) are not objectionable, and do not weaken the timber. But horizontal cracks (as D, Fig. 129), are decidedly so, and should not be allowed.

Knots. Knots in timber are another element of weakness. They are the hearts, where branches grow out of the trunk. If they are of nearly the same color as the wood, and their rings gradually die out into it, they need not be seriously feared. If, however, they are very dark or black, they are sure to shrink and fall out in time, leaving, of course, a hole and weakness at that place. Dead knots, — that is, loose knots, in a piece of timber, mean, as a rule, that the heart is decaying. Knots should be avoided at the centre of a beam, regularly loaded, and at the point of greatest bending moment, where the loads are irregular. The farther the knots (and cracks) are from these points the better.

Wind-shakes. Timber with "wind-shakes" should be entirely avoided, as it has no strength. These are caused by the wind shaking tall trees, loosening the rings from each other, so that when the timber is sawed, the wood is full of small, almost separate pieces or splinters at these points.

A timber with wind-shakes should be condemned as unsound.

A timber with the rings at the end showing nearly vertical (E Fig. 130) will be much stronger than one showing them nearly horizontal. (F Fig. 131.)

Signs of sound Timber. To tell sound timber, Lord Bacon recommended to speak through it to a friend from end to end. If the voice is distinctly heard at the other end it is sound. If the voice comes abruptly or indistinctly it is knotty, imperfect at the heart, or decayed. More recent authorities recommend listening to the ticking of a watch at the other end, or the scratching of a pin on its surface. If, in sawing across a piece it makes a clean cut, it is neither too green nor decayed. The same if the section looks bright and smells sweet. If the section is soft or splinters up badly it is decayed. If it wets the saw it is full of sap and green. If a blow on timber rings out clearly it is sound; if it sounds soft, subdued, or dull, it is very green or else decayed. The color at freshly-sawed spots should be uniform throughout; timbers of darker cross-section are generally stronger than those of lighter color (of the same kind of wood.)

The annular rings should be perfectly regular. The closer they are, the stronger the wood. Their direction should be parallel to the axis throughout the length of the timber, or it will surely twist in time, and is, besides, much weaker. Where the rings at both ends are not in the same direction the timber has either twisted in growing, or has a "wandering heart," — that is, a crooked one. Such timber should be condemned. Besides looking at the rings at the end, a longitudinal cut near the heart will show whether it has grown regularly and straight, or whether it has twisted or wandered.

The weight of timber is important in judging its quality. If specimens of a wood are much heavier than the well-known weight of that wood, when seasoned, they may be condemned as green and full of sap. If they are much lighter than thoroughly seasoned specimens of the same wood, they are very probably decayed.

Methods of Seasoning. Tredgold claims that timber is "seasoned" when it has lost one-fifth of its original weight (when green); and "dry" when it has lost one-third. Some timbers, however, lose nearly one-half of their original weight in drying. Many methods are used to season or dry timber quickly.

The best method, however, is to stack the timber on dry ground (in as dry an atmosphere as possible) and in such a position that the air can circulate, as freely as possible around each piece. Sheds are built over the timber to protect it from the sun, rain, and also from severe winds as far as possible.

Timber dried slowly, in this manner, is the best. It will crack somewhat, but not so much so as hastily dried timber. Many processes are used to keep it from cracking, the most effective being to bore the timber from end to end, at the centre, where the loss of material does not weaken it much, while the hole greatly relieves the strain from shrinkage. Some authorities claim that two years' exposure is sufficient, though formerly timber was kept very much longer. But even two years is rarely granted with our modern conditions, and most of the seasoning is done after the timber is in the building. Hence its frequent decay. There are many artificial methods for drying timber, but they are expensive. The best known is to place it in a kiln and force a rapid current of heated air past it, this is known as "kiln-drying." It is very apt to badly "check" or crack the wood. To preserve timber, besides charring, the "creosoting" process is most effective. The timber is placed in an iron chamber, from which the air is exhausted; after which creosote is forced in under a high pressure, filling, of course, all the pores which have been forced open by the suction of the departing air. Creosoted wood, however, cannot be used in dwellings, as the least application of warmed air to it, causes a strong odor, and would render the building untenantable.

Manner of shrinkage. In shrinking the distance *between* rings remains constant, and it is for this reason that the finest floors are made from quartered stuff; for (besides their greater beauty), the rings being all on end, no horizontal shrinkage will take place; the width of boards remaining constant, and the shrinkage being only in their thickness; neither will timber shrink on end or in its length. Figures 132 and 133 show how timber will shrink. The first from a quartered log, the other from one with parallel cuts. The dotted part shows the shrinkage. The side-pieces G in Fig. 133 will curl, as shown, besides shrinking. By observing the directions of the annular rings, therefore, the future behavior of the timber can be readily predicted. Of course, the figures are greatly exaggerated to show the effect more clearly.

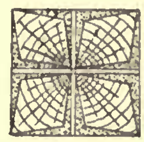


Fig. 132.

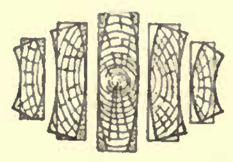


Fig. 133.

Decay of Timber. If the heart is not straight its entire length, the piece will twist lengthwise. Shrinkage is a serious danger, but the chief danger in the use of timber lies in its decay. All timber will decay in time, but if it is properly dried, before being built in, and all sap-wood discarded, and then so placed that no moisture can get to the timber, while fresh air has access to all parts of it, it will last for a very long time; some woods even for many centuries. In proportion as we neglect the above rules, will its life be short-lived. There are two kinds of decay, *wet* and *dry* rot. The wet rot is caused by alternating exposures to dampness and dryness; or by exposure to moisture and heat; the dry-rot, by confining the timber in an air-tight place. In wet rot there is "an excess of evaporation;" in dry rot there is an "imperfect evaporation." Beams with ends built solidly into walls are apt to rot; also beams surrounded solidly with fire-proof materials; beams in damp, close, and imperfectly ventilated cellars; sleepers bedded solidly in damp mortar or concrete, and covered with impervious papers or other materials; also timbers exposed only at intervals to water or dampness, or timbers in "solid" timbered floors.

Dry rot is like a contagious disease, and will gradually not only eat up the entire timber, but will attack all adjoining sound woodwork. Where rotted woodwork is removed, all adjoining woodwork, masonry, etc., should be thoroughly scraped and washed with strong acids.

Ventilation necessary. Where wood has, of necessity, to be surrounded with fireproof materials, a system of pipes or other arrangements, should be made to force air to same through holes, either in the floors or ceilings, but in no case connecting two floors; the holes can then be made small enough not to allow the passage of fire. Where the air is forced in under pressure it would be advisable at times to force in disinfectants, such as steam containing evaporated carbolic acid, fumes of sulphur, etc.

Coating woodwork with paint or other preparations will only rot the wood, unless it has been first thoroughly dried and every particle of sap removed.

Cross-bridging. Timber must not be used too thin, or it will be apt to twist. For this reason floor-beams should not be used thinner than three inches. To avoid twisting and curling, cross-bridging is resorted to. That is, strips usually 2″ × 3″ are cut between the beams, from the bottom of one to the top of the next one, the ends being cut (in a mitre-box), so as to fit accurately against the sides of beams, and each end nailed with at least two strong nails. The strips are always placed in double courses, across the beams, the courses crossing each other like the letter x between each pair of beams. This is known as "herring-bone" cross-bridging. Care should be taken that all the parallel pieces in each course are in the same line or plane. The lines of cross-bridging can be placed as frequently as desired, for the more there are, the stiffer will be the floor. About six feet between the lines is a good average. Sometimes solid blocks are used between the beams, in place of the herring-bone bridging.

Cross-bridging is also of great help to a floor by relieving an individual beam from any great weight accidentally placed on it (such as one leg of a safe, or one end of a book-case), and distributing the weight to the adjoining beams. Unequal settlements of the individual beams are thus avoided. Where a floor shows signs of weakness, or lacks stiffness, or where it is desirable to force old beams, that cannot be well removed, to do more work, two lines of slightly wedge-shaped blocks are driven tightly between the beams, in place of the cross-bridging. The beams are then bored, and an iron rod is run between the lines of wedges, from the outer beam at one end to the outer beam at the other, and, of course, at right angles to all. At one end the rod has a thread and nut, and by screwing up the latter the beams are all forced upwards, "cambered," and the entire floor arched. It will be found much stronger and stiffer; but, of course, will need levelling for both floor and ceiling. Under the head and nut at ends of rod, there must be ample washers, or the sides of end beams will be crushed in, and the effect of the rod destroyed.

Stiffening weak floors.

Girders, which cannot be stiffened sideways, should be, at least, half as thick as they are deep, to avoid lateral flexure.

Framing of beams. In using wooden beams and girders, much framing has to be resorted to. The used joints between timbers are numerous, but only a very few need special mention here. Beams should not rest on girders, if it can be avoided, on account of the additional dropping caused by the sum of the shrinkage of both, where one is over the other. If framing is too expensive, bolt a wide piece to the under side of the girder, sufficiently wider than the girder to allow the beams to rest on it, each side. If this is not practicable bolt pieces onto each side of the girder, at the bottom, and notch out the beams to rest against and over these pieces. The bearing of a beam should always be as near its bottom as possible. If a beam is notched so as to bear near its centre, it will split longitudinally. Where a notch of more than one-third the height of beam, from the bottom, is necessary, a wrought-iron strap or belt should be secured around the end of beam, to keep it from splitting lengthwise.

If framing can be used, the best method is the "tusk and tenon" joint, as shown in Figs. 134 and 135. In the one case the tenon goes through the girder and is secured by a wooden wedge on the other side; in the other it goes in only about a length equal to twice its depth, and is spiked from the top of girder. The latter is the most used. By both methods the girder is weakened but very little, the principal cut being near its neutral axis, while the beam gets bearing near its bottom, and its tenon is thoroughly strengthened to prevent its shearing off. The dimensions given in the figures are all in parts of the height of beams. Headers and trimmers at fire-places and other openings are frequently framed together, though it would be more advisable to use "stirrup-irons." The short tail-beams, however, can be safely tenoned into the header.

Fig. 134.

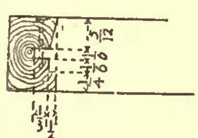


Fig. 135.

In calculating the strength of framed timber, the point where the mortise, etc., are cut, should be carefully calculated by itself, as the cutting frequently renders it dangerously weak, at this point, if not allowed for. For the same reason plumbers should not be allowed to cut timbers. As a rule, however, cuts near the wall are not dangerous, as the beam being of uniform size throughout, there is usually an excess of strength near the wall.

Stirrup-irons. Stirrup-irons are made of wrought-iron; they are secured to one timber in order to provide a resting-place for another timber, usually at right angles to and carried by the former. They should always lap over the farther side of the carrying timber, to prevent slipping, as shown in Fig. 136.

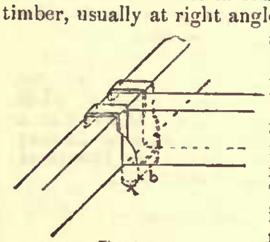


Fig. 136.

The iron should be sufficiently wide not to crush the beam, where resting on it; the section of iron must be sufficient not to shear off each side of beams. The twist must not be too sudden, or it will straighten out and let the carried timber down. To put the above in formulæ we should have:

for the width of stirrup-iron (x)

Width of Stirrup-irons.

$$x = \frac{s}{b.\left(\frac{c}{f}\right)} \qquad (69)$$

Where x = the width of stirrup-iron, in inches.

Where s = the shearing strain, in lbs., on end of beam, being carried.

Where b = the width of beam being carried, in inches.

Where $\left(\frac{c}{f}\right)$ = the safe resistance, in pounds, to compression, across the fibres, of the beam, being carried.

For the thickness of stirrup-iron we should have:

$$y = \frac{s}{2.x.\left(\frac{g}{f}\right)} \qquad (70)$$

Which for wrought-iron (Table IV.) becomes.

Thickness of Stirrup-iron.

$$y = \frac{s}{16000.\,x} \qquad (71)$$

Where y = the thickness of stirrup-iron, in inches.

Where s = the shearing strain on end of beam, in lbs.

Where x = is found by formula (69).

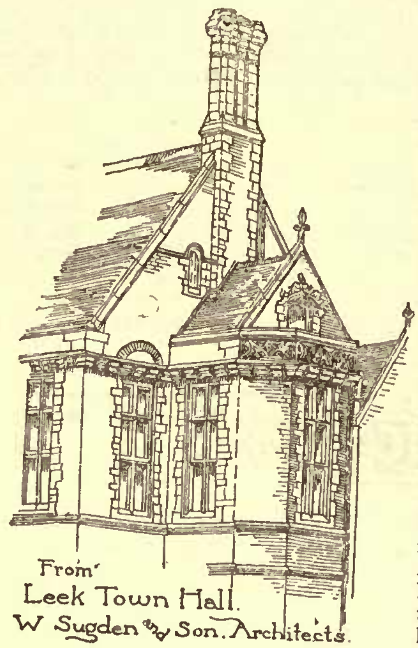
Providing, however, that y should never be *less* than one-quarter inch thick.

Louis DeCoppet Berg.

[To be continued.]

LONDON NOTES.

London, December 17, 1887.



Yesterday the first pitched battle was fought between the promoters of the Architects' and Engineers' Registration Bill, which is going to be introduced into Parliament next session by Colonel Duncan, R. A., M. P., and their opponents. The object of this movement is, no doubt, pretty well-known. There are a large number of architects in England who feel that architecture, as a profession, does not receive that protection from the State that it deserves. They point to the sister professions of law and medicine, and say, with much justice, that the honor and dignity of these professions is upheld by a State Regulation whereby no person may publicly practise, without having previously passed a qualifying examination.

Therefore these professions are kept clear of quacks, and the public, when it employs a lawyer or a doctor, feels confident that it is not throwing its money away upon mere charlatans, persons, in fact incompetent to carry out what they profess.

The other side reply that it is quite impossible to compare such professions as law and medicine with architecture. Architecture, they say, is an art, not a profession. Our companions are the painter and the sculptor, not the engineer and surveyor, and it is manifestly impossible to satisfactorily conduct an examination in a subject which is, after all, merely a matter of taste. Therefore to impose a uniform qualifying examination in architecture is, first of all, impossible; and, secondly, even if it were practicable, would be most undesirable. "We have in England," say they, "a delightful freedom in design, and we have only to point to France to show you what injurious effects are produced by this stifling of individual enterprise, and of liberty in design." And so the fight goes on.

The meeting last night was promoted by the Architectural Association, and was held in the Council Chamber of the Royal Institute of British Architects. The room was crowded to excess, and among those present I noticed Mr. Arthur Cates, the Chairman of the Board of Examiners for the Obligatory Examination in Architecture, Professor Kerr, of King's College, Mr. Roumieu Gough, Leader of the Registrationists, and many other gentlemen of high standing in the profession. The eminent Oxford architect, Mr. T. G. Jackson, M.A., opened the discussion on behalf of the anti-Registrationists with a most able paper, abounding in neat hits and telling arguments, in which he strongly, almost vehemently, opposed the institution of qualifying examinations. He resumed his seat amid rounds of ringing applause. Speaker after speaker followed, but there was no doubt on which side the feeling of the meeting was; indeed, the students were at times a trifle too demonstrative in their hostility to the Registrationists. It was a little amusing, though, to see the neat way in which responsible speakers steered clear of the difficult subject, and I question very much if last night's meeting was more than a preliminary skirmish before the fight. There are exciting times before us, we may be sure.

I went to the Royal Academy the other day to see the exhibition of the Academy students' work for the past year. There was a large and fashionable gathering, but as usual the paintings were the chief attraction. "No doubt these are all very clever," said a lady to me, when looking at the architectural drawings, "but, you know, I really don't understand them. Let's go and look at the pictures."

The subject set for the Gold Medal and £200 Travelling Studentship was a Railway Station! Could any one, in his senses, have believed it possible that the august body at Burlington House would have descended to so matter-of-fact a subject. This is a "sign

of the times," with a vengeance. The difficulties of the problem were very courageously attacked in several cases, but the huge iron roof proved too much for most of the competitors. One or two tried, with more or less success, to treat it architecturally, but the majority hopelessly gave it up, and we were edified by most ingenious attempts to decorate the segmental end of the roof. The prize was, I think, fairly won by Mr. Schultz, though the decision of the judges met with a good deal of criticism.

The competition for an oil painting upon the suggestive word "Captives," produced a most interesting collection, the early Britons and their Roman masters being the favorite subject. One most attractive picture depicted a first-class railway-carriage containing a forger who had just been arrested, and his wife, while the detective in the corner, was sharply watching (over the top of his newspaper) the struggles of his prisoner to free himself from the "bracelets." Altogether the exhibition was pronounced to be highly satisfactory.

On Thursday, the Corporation of the City of London elected a city architect, in the place of the late Horace Jones, who received his knighthood, it will be remembered, when the Prince of Wales laid the foundation of the new bridge which is to be thrown across the Thames at the Tower. As the salary and emoluments of the office are considerable, there was a sharp competition. Mr. Alexander Peebles, an architect well-known in the "City," succeeded in gaining the appointment. Mr. Charles Barry, son of Sir Charles Barry, who designed the Houses of Parliament, and Mr. W. H. Crossland, architect to the Royal Holloway College, taking the second and third places respectively. "CHIEL."

COMMUNICATIONS

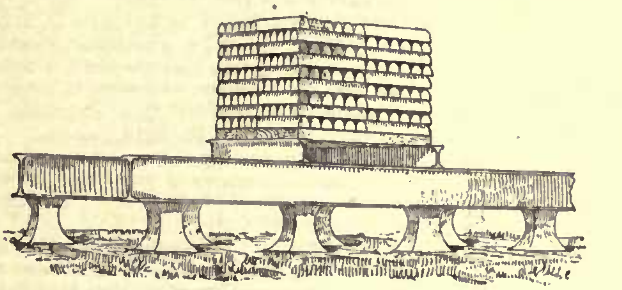
A FAULTY GROUND-TESTING APPARATUS.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — While waiting in the Baltimore depot at Washington I made the following notes, which I send to you:

While in Washington last Saturday I noticed the machine being used to test the soil under the footings for the new Government Library building of which you recently spoke editorialy, and it seemed that from the way it was constructed that it would give unsatisfactory results unless the greatest care was used in operating it, and even then I should think it would be inaccurate. It was not in operation when I saw it. Reference to the accompanying sketch will explain what follows.

The platform, loaded with bars of iron, rests upon two I-beams, each I-beam resting upon five or six supports flanging out to a broad base. The load was placed directly over four of the supports, but it was not evenly distributed over the platform. Now what impressed me was this: as soon as any one of these four supports begins to



settle, the load is thrown upon the supports not under the load and in amount inversely as the distance of the support from the centre of gravity of the load, but, as the soil may vary slightly, settlements might occur under some of the supports which would make it impossible to tell which ones carried the load and consequently how much load there was upon each. Although it would take more time, I should think that more satisfactory results could be obtained by having a larger base and only one, and thus testing one point at a time.

Very respectfully,
CLARENCE O. AREY.

LETTING EXTRAS TO AN OUTSIDER.

MONTREAL, CAN., December 15, 1887.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — I would be obliged if you think proper to give an answer to the following. On the following question, A is the architect, P the proprietor, and C the contractor.

P gives a building contract for a certain amount, say $50,000, to C. Later on P wishes to give some new works, say cupboards and the like. He orders A to ask a couple of tenders for said work, one to C and one to an outsider. Then the tenders are in and it happens that the *outsider* is very much the lower on some items, though higher on others, and on the whole comes a little lower than C, say some $50 on $1,000 or job. P had some idea to give part of the job to one and part to the other according to their prices, but A had no difficulty in dissuading him from that, but P sticks to giving the extra contract to the outsider, while A thinks that is not absolutely fair. There is no ill feeling between A, P and C, the only thing is that A would not wish to look too much interested in C, but desires to give him full justice, and P, representing a committee, feels as if he had to be *positively legal*. The answer I wish, if you have the kindness to give it, should not be on the legality of P's intentions, but on the dignity to be observed on such matters. I remain, sirs,

Your obliged servant, J. V.

[THE answer to this question depends in some degree on the wording of the contract. There is no doubt that the ordinary courtesy among mechanics would give the contractor for the building the preference in any extra work that might be required. This does not mean, however, that he can get an extravagant price for it, and most architects, instead of getting estimates from two or three parties for the extra work, and thus putting themselves in the predicament of having either to accept the contractor's price, which they may consider too high, or give the work to an outsider, with the prospect of hard feeling and annoyance, find it better to order all extra work to be done by the general contractor, without stipulation beforehand as to the price further than that usually contained in the contract, that extra work shall be paid for "at a fair and reasonable valuation," and trust to their own authority for seeing this stipulation complied with. To illustrate this point: We once had some work done by a rather sharp contractor. A little extra work was necessary, and the owner asked us, rather against our judgment, to get an estimate from the contractor before ordering it. We did so, and the contractor estimated the work at eighty-five dollars. The real value was about fifteen dollars, and if we had been permitted to order it without question, we should have refused to certify for more than this, and the contractor would probably have accepted it without objection. His previous estimate of eighty-five, however, made it difficult to order him to do the work without, by implication, agreeing to his price, while an order to do the work for fifteen would have provoked a quarrel at once. We were obliged to escape from the dilemma, therefore, by notifying him that his offer was not accepted, and allowing him to finish his contract, sending some one else after he had got through to make the needed change. In the case of which our correspondent speaks, P, as acting for others, is quite right in thinking it important for him to accept the lowest tender for the work, but we think that A would be justified in saying that the annoyance of having two mechanics in the building would be worth nearly the difference, and C might well afford, in consideration of not being disturbed, to reduce his price to that of the other man. — EDS. AMERICAN ARCHITECT.]

BOOKS.

ROCHESTER, N. Y.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs: — Will you be kind enough to inform me what would be the best books to purchase, one of them a general treatise on Architecture of a constructional nature — also a good book on Interior Decoration. I would like the latest publications. Could you give me the cost and author of each, and where to be obtained?

Yours truly, F. A. BROCKETT.

["*Building Superintendence*" by T. M. Clark, published by Ticknor & Co., price $3. "*Notes on Building Construction*" by Col. Smith, published by Rivingtons, London, 3 vols., price $13.50; "*L'Art de batir*" by Daniel Ramée; "*Traité de l'Architecture*" by Léonce Reynaud. The latest book on decoration is "*Interior Decoration*" by A. W. Brunner and T. Tryon, published by W. T. Comstock, price $3. — EDS. AMERICAN ARCHITECT.]

ARCHITECTURAL JOURNALS.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs: — Kindly assist a student by giving names of architectural publications in France, Spain, Italy, Germany and Russia, and names of publishers. Names of journals published in other countries (not English) will also be "thankfully received."

Very respectfully, F. W. FITZPATRICK.

[*Revue Générale d' Architecture; Moniteur des Architectes; Encyclopédie d'Architecture; Bulletin Mensuel de la Société Centrale des Architectes; La Semaine des Constructeurs; La Construction Moderne*, all of Paris. *Deutsche Bauzeitung*, Berlin; *Weiner Bauindustrie Zeitung*, Vienna; *Architectonische Rundschau*, Stuttgart; *Zodtchy*, St. Petersburg; are among the most important. — EDS. AMERICAN ARCHITECT.]

WAREHOUSE FLOOR CONSTRUCTION.

PHILADELPHIA, PA., December 12, 1887.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — In your last issue I notice under heading of "A Poorly-constructed Floor" several diagrams of post and girder construction, which, from the lack of proper precaution in the proportioning and placing of its parts, is decidedly dangerous by reason of the timbers forming the girders deflecting laterally and severally crushing, as in this case they have done and will continue to do beyond hope of repair. The system here attempted is one of the best that can be devised for continuous girders of wood, but the parts require the nicest adjustment to ensure stability. The element of shrinkage needs to be taken into account and parts so connected and designed as to admit of tightening up from time to time. I take pleasure in sending you blue prints [see Illustrations] of the construction of a five-story flour and grain warehouse built in this city under my supervision when architect for the Pennsylvania R. R. Co. The load per square foot, including weight of construction, runs as high as three hundred pounds.

Yours truly,
W. BLEDDYN POWELL.

NOTES AND CLIPPINGS

Artists' Colors. — From the cochineal insect is obtained the gorgeous carmine, as well as the crimson, scarlet, and purple lakes. Sepia is the inky fluid discharged by the cuttle-fish to render the water opaque for its own concealment when attacked. Indian yellow is from the urine of the camel. Ivory black and bone black are made out of ivory chips. The exquisite Prussian blue is got by fusing horses' hoofs and other refuse animal matter with impure potassium carbonate. It was discovered by an accident. In the vegetable kingdom are included the lakes, derived from roots, barks, and gums. Blue black is from the charcoal of the vine stalk. Lamp black is soot from certain resinous substances. From the madder plant, which grows in Hindustan, is manufactured Turkey red. Gamboge comes from the yellow sap of a tree, which the natives of Siam catch in cocoanut shells. Raw sienna is the natural earth from the neighborhood of Sienna, Italy. When burned it is burned sienna. Raw umber is an earth from Umbria, and is also burned. To these vegetable pigments may probably be added Indian ink, which is said to be made from burnt camphor. The Chinese, who alone can produce it, will not reveal the secret of its composition. Mastic — the base of the varnish so called — is from the gum of the mastic tree, indigenous to the Grecian archipelago. Bistre is the soot of wood ashes. Of real ultramarine but little is found in the market. It is obtained from the precious lapis lazuli, and commands a fabulous price. Chinese white is zinc. Scarlet is iodide of mercury, and cinnabar, or native vermilion, is from quicksilver ore. — *New Orleans Picayune.*

The World's Big Waterfalls. — According to Dr. Wertsch, the highest waterfalls are the three Krimbs Falls, in the upper Prinzgau, which have a total height of 1148 feet. The three falls next in height are found in Scandinavia — the Verme Foss, in Romsdal, 984 feet; the Vettis Foss, on the Sogne Fjord, 853 feet; the Rjuken Foss, in Thelemarken, 804 feet. With a decrease in height of 213 feet, the three Velino Falls, 591 feet, near Zerni, the birthplace of the historian Tacitus, follow next and are succeeded by the three Tessa Falls, in the Val Formazza, 541 feet. The Gastein Falls, in the Gastein Valley, 469 feet, are midway between the Skjaggedal Foss, in the Hardanger Fjord, 424 feet, and the Boring Foss, in the same fjord. The great Anio Cascade near Tivoli, 315 feet, appears small by the side of the foregoing, but is still larger than the Falls of the Elbe in the Riesengebirge, which are only 148 feet high. If the width of the falls is taken into consideration, the most imposing are those of the Victoria Falls of the Zambesi, which are 394 feet high by a width of 8,200 feet. A long way behind come the Niagara Falls, 177 feet high and 1,968 feet wide. The third largest fall is that of the Rhine at Schaffhausen, 148 feet wide, by only 33 feet high. The highest waterfalls mentioned cannot compare with those gigantic falls as regards cubic contents. — *Iron.*

The Elevator for the Eiffel Tower. — A curious elevator has been proposed for use in the Eiffel tower, which it is proposed to erect in Paris for the next exhibition. The tower is to be 984 feet high, and none of the ordinary forms of elevators could be used with safety. The plan proposed is to construct in the interior of a cylindrical tower a spiral railway track, on which shall run a truck occupying the whole interior space. This circular truck carries a double-decked car which is raised by the latter's revolution. Motion is communicated to the truck by an endless cable driven by a stationary engine. This cable passes through the car and runs over a series of friction-pulleys, which communicate their motion to the trucks through a worm-gear and spur-wheel. The weight of the elevator-car is supported by the wheels of the truck, and these are only to be revolved by the worm-gear. Consequently, if anything should happen to the cable, the car would not descend, but would remain stationary until the persons in the car started the gear, and would then only descend as long as motion continued to be given to it. The cable is run at a high speed, which the gear reduces, and thus it is possible to use quite a small cable to give motion to a car containing two hundred people. — *Iron.*

Compound for Patching Stone. — The restoration of some of the most important stone structures in Paris, such as the colonnade of the Louvre, of the Pont Neuf, and of the Conservatoire des Arts of Metiers, has been mainly accomplished by means of a metallic cement invented by Professor Brune. It consists of a powder and a liquid, the first composed of two parts by weight of oxide of zinc, two of crushed limestone of a hard nature, and one of crushed grit, the whole intimately mixed and ground, ochre in suitable proportions being added as a coloring matter. The liquid employed consists of a saturated solution of zinc in commercial hydrochloric acid, to which is added a part by weight of hydrochlorate of ammonia, equal to one-sixth that of the dissolved zinc, and this liquid is diluted with two-thirds of its bulk of water. In using the cement, one pound of the powder is mixed with two and a half pints of the liquid. The cement hardens very quickly and is of great strength. — *Exchange.*

The Canadian Parcels-Post. — As there appears to be an impression that the new parcels-post to be established on the 1st of February between Canada and the United States is to be confined to correspondence, books, etc., it may be as well to state that it is to include merchandise. The maximum weight will be five pounds, and the rate 12 1-2 cents per pound. — *Montreal Witness.*

Munich International Art Exhibition. — This Exhibition will be held in the Royal Crystal Palace at Munich. It will be opened on the 1st of June, 1888, and will continue open until the end of October. Works of art of all countries in the departments of painting, sculpture, architecture, drawing, and reproduction are admitted. Works of art-industry, if they are entitled by artistic invention and execution to be considered as works of art, will also be admitted, but only on the special invitation of the Central Committee, or by the Collective Commissioners. The Central Committee defray the expenses of transport of all works of art approved by a jury of admission. All applications must be received by the Central Committee (Luitpoldstrasse, Nr. 3, München) by the 15th of March next, but no work of art must arrive at Munich before the 1st of April.

An Apprentice cannot join a Union. — In the County Courts today Judge Baily gave a boy apprentice in a glass factory one week in which to return to work or suffer sentence. The boy's defence was that he supposed he was discharged because he had joined a labor union, which had entered upon a strike. Judge Baily decides that an apprentice cannot join a union.

TRADE SURVEYS

In the six cities of New York, Philadelphia, Chicago, St. Louis, Kansas City and St. Paul, the estimated increase in this year's building operations over the past, and it is largely guess-work, is put at between twenty and twenty-five million dollars. In three of the Western cities, architects and builders have received instructions to push work a little sooner than usual. Manufacturers of building material in several Western cities have already secured contracts for material and supplies to be furnished during the coming spring and summer. Several railroad companies have also bought liberally of lumber, brick, stone and other material to be used in the construction of work agreed upon. These are favorable indications, and they certainly point to an active resumption of work in the spring. All that has been said in the trade and financial columns of daily and weekly papers has not as yet intimidated promoters of new railway or industrial enterprises. A great deal of money is being offered in Eastern financial centres, and, even were enterprise halting, it would be stimulated by the liberality of money-lenders, especially in real estate and land schemes, which seem to be multiplying of late rather than declining. There is an abundance of money available for Western borrowing farmers and Southern borrowing planters. Builders who have important house-building schemes in hand are encouraged by local capital throughout the West and in some parts of the South. During the month of December, a great many requirements were made out by railroads, manufacturers and buyers of material of one kind or another, and these requirements will take the shape of orders this month. There is a slight downward tendency in prices, but it may disappear at any moment. A slight decrease in the volume of business is noted day by day and week by week as against twelve months ago, but this is not regarded as of any moment. The stocks of material for working up in the hands of manufacturers, the stocks of supplies in the hands of railroads, and the stocks in the hands of jobbers and retailers are all lighter than business experience and prudence require, but consumers prefer to run with light stocks chiefly because of the enormous producing capacity of the country and because of the supposed probability of an overcrowding of the channels of production. This is really a very remote danger. A careful study of the entire situation does not warrant the opinion that the country is in danger of an over-supply. A few reasons for this confident belief against an over-supply can be given in a few words. First, the volume of money is sufficient to keep enterprise actively engaged. Railroad expansion, while it has gone a little beyond immediate requirements, is below the requirements of twelve months hence in three-fourths of the territory in the United States. Railroad-builders recognize this fact. Then, a great demand is already springing up for river and lake crafts, a fact which cannot be too strongly dwelt upon. Then, again, the demand for materials and supplies for shop-work, mill-work, factory and foundry work, is a factor which is under-estimated by all excepting the few whose business it is to follow up and solicit work of this character. The machinists, the founders and the manufacturers of the country know better than editors and financial reviewers the real extent and depth of the coming demand for supplies. Bankers are preparing weekly clearing-house exchanges from thirty and forty cities, and weekly and monthly returns from one hundred railroads and more, and are noting the weekly list of commercial failures, and the volume of freight-traffic over the trunk lines, but there are other and more important matters to be looked at in order to have a proper understanding of the real tendencies at work beneath the surface of trade. The country is not really over-producing, and there is not any danger of over-production in sight, yet an apparent over-production may develop itself within ninety days. If it does it will. The merchant-steel workmen are endeavoring to advance wages ten per cent. Bituminous miners in some parts of the West are demanding a recognition of the old basis of wages made at Columbus, O., and the refusal to recognize it may probably result in the suspension of work in several localities. Neither the supply of coal or prices can be affected by any probable action of miners in the West, because of the great increase in the number of mine openings. Several Western railroad companies have within the past four months developed their own sources of supply, and most of the railroad companies west of the Mississippi are now following this policy. The anthracite miners went on strike this week and declare their ability to remain out six months. The production of both anthracite and bituminous coal is, according to present estimates, about eight million tons ahead of 1886. The anthracite miners have been the victims of oppression and injustice beyond the lot of the average workman, and public sentiment in Pennsylvania, where the conditions are understood, and in some other sections, seems to be largely with them. A Wall Street paper is authority for the statement that next year's building operations in New York will reach sixty-five million dollars. Very heavy disbursements this month will help to ease up the money market and possibly improve collections, which for some weeks past have been rather difficult. Brokers and manufacturers expect an improvement in the volume of business during this month, and the conditions of the country seem to fully warrant the expectation. In a general way stocks are light. The textile manufacturers are crowded in the cotton-producing line. Makers of machinery in the New England and Middle States are mostly busy, and about fifteen to twenty per cent of the capacity will work overtime for a few weeks. The iron and steel mills throughout the West resumed full time on Tuesday. Throughout the South that industry continues to be exceptionally prosperous. On some railroads in the West large discharges of men have been made by way of guarding against the anticipated demand for an advance.

S. J. Parkhill & Co., Printers, Boston.

THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. XXIII. No. 629.

Copyright, 1888, by TICKNOR & COMPANY, Boston, Mass.

JANUARY 14, 1888.

Entered at the Post-Office at Boston as second-class matter.

CONTENTS

IT is a satisfaction to find that the Americans are certainly giving lessons to the rest of the world in matters of construction, if not of art. Perhaps the art will come later. Not long ago a great fire took place in Berlin, totally destroying a structure composed wholly of brick and iron, and built with the solidity characteristic of German work. The building was a storage-warehouse for the great Berlin express company, and was about a hundred feet wide, and a hundred and fifty long, six stories high, with a small court-yard in the centre. A heavy brick wall divided it through the middle, and the floors were all made with brick arches, turned between iron beams, which rested on the walls, and on ranges of iron girders, supported by cast-iron columns. The doors in the partition-wall were of plate-iron. We have learned by experience the vulnerable points of such a structure, but to the Germans, unaccustomed to destructive fires, it must have seemed as fireproof as it would have to us thirty years ago. Five months after the building was substantially completed, one or two temporary openings were made in the third story floor, for the purpose of finishing some part of the work, and while these were still open, an accident occurred, by which fire was set to some goods stored in the third story. The flaming brands immediately fell through the holes in the floor, setting fire to the goods in the next story below, which were mostly cotton and woollen materials, and although the fire-engines arrived in five minutes after the fire started, they were too late to be of any service. Five minutes seems a short time for a fire starting in a little bundle of dry goods to accomplish the destruction of a huge building, in the construction of which there was not a trace of inflammable material, but no sooner had the nearest bales become kindled than the iron beams over them, quickly heated by the flames, expanded, violently wrenching the girders, and in many cases breaking off the capitals of the columns. In this effort the beams themselves were bent and twisted, letting the brick floor-arches fall; and so quickly did this effect occur that many of the floor-arches had fallen out before the engines arrived, five minutes from the setting of the fire. The collapse of the arches not only opened a passage upward for the flames, but piled broken cases, torn cloth and other combustibles, in the best condition for speedy kindling, upon the blazing goods beneath, and the west half of the structure, in which the fire first caught, was soon a mass of flames. The eastern half was cut off by means of the iron doors, all of which had been duly closed, but these soon became red-hot from the action of the fire behind them, and in that way set fire to goods lying against them, and they also soon warped enough to let the flames through, and hasten the effect, so that in one hour from the first alarm little remained of the western half of the building but the tottering outside walls, a large portion of which had already fallen, while the three upper stories of the eastern half, notwithstanding the brick partition wall and the iron doors, were totally destroyed, and the lower stories nearly ruined by the fall of the upper floor-arches. On examining the place after the fire, it was found that out of one hundred columns which originally held the floors, thirty-eight had been thrown completely out of their places, while thirty-four more, although they remained standing, were so broken or bent as to be useless, the only ones still fit for service being those in the lower stories of the eastern half of the building. The girders were formed of iron beams, eighteen inches deep, and these were in some places twisted like corkscrews by the strain which they had undergone. An expert commission was immediately appointed to study into the causes of the fire, and made a report expressing the opinion that no building could henceforth be considered fireproof unless the flanges of iron beams, and all portions of iron columns, were "covered by some non-conducting material," as "is now commonly done in such structures in the great cities of the United States of America."

MR. JOHN C. COCHRANE, of Chicago, an architect of high reputation all over the country, died last month at his residence, after a short illness. Mr. Cochrane was born in New Hampshire in 1833, and, after completing his education, removed first to Chicago, and then to Davenport, Iowa, where he entered upon a very successful practice. In 1864 he returned to Chicago, and has been prominent in professional matters in that city ever since. His best-known building is the Chamber of Commerce, but he designed many churches and private dwellings, showing a refinement of taste which, at the time when he first began his work, was particularly valuable in the West. He will be greatly missed in the profession and in society in a large part of the West.

BOTH the *Builder* and the *British Architect* have of late had a good deal to say about the uniform rate of commission which is maintained among architects all over the world. To them, as, indeed, to a great many thoughtful persons in the profession, there seems to be a good deal that is objectionable in a rate of compensation which is the same for the consummate artist as for the young beginner or the ignorant pretender to professional knowledge. In the interest of art, both of them think it a misfortune that a man capable of making perfect examples of architectural art should be condemned by the rule on which his compensation is based, either to disregard the beautiful ideals floating through his mind and get through his work with the same expenditure of thought that his soulless competitor next door would bestow on it, or, if he chooses to follow art for art's sake, to be obliged to do so at his own expense, since no higher remuneration is provided for the author of a beautiful building than of an ugly one. It must be confessed that there is a good deal to say on this side of the subject, but there is another side which is well presented in a letter to the *British Architect* by Mr. Basil Champneys. In this letter, although Mr. Champneys admits that the architects who study their work like true artists are very inadequately paid by a five per cent commission, and, moreover, that it is rather an anomaly that the most experienced men should be paid at the same rate as beginners, he considers, nevertheless, that there are advantages in the present system which should not be rashly given up. As to the artistic part of the work, he believes, at the outset, that this is never paid for directly at all. No matter how consummate an artist a man may be, he is paid for designing and putting up a building which is reasonably convenient and will not fall down. If he accomplishes this, he is entitled to his full fee, and the idea that if he studies its masses and proportions, refines its details and seeks inspiration for its decoration, he is entitled to be paid any more, has not as yet occurred to the public, whatever the profession may think about it. For the present, moreover, Mr. Champneys thinks that this state of things is inevitable. A time may come when the public will understand architectural art and pay for it directly, but it is now practically incapable of recognizing such art when it is offered them, and would be quite as likely to be taken in by the outcries of an advertising architectural buffoon as by the pure and deeply-felt beauty of a master's work, so that whether we wish it or not, we must content ourselves with what he calls the wholesome position, that we must do the best we can for art because we love it and not because we love money.

SIMPLY as a practical matter, however, the five per cent rule is worth holding on to until something better can be generally accepted. It is true that under it the beginner receives the same proportionate fee as his abler or wiser rival, but the beginner's commissions are usually few and of no great importance, while his experienced neighbor is kept constantly busy with work involving the expenditure of large sums, so that the latter's income, at the same percentage, is many times as great as that of the younger man. Besides this, the same rule brings about an indirect compensation for artistic capacity and study. Although the public cannot say what it likes, and is easily misled by every one with a new architectural nostrum, in the end it usually comes back to what is pretty, unassuming, and interesting, in other words, to what is artistic, and the man who tries hard and successfully to make his work artistic is generally rewarded by having plenty of employment, while the ill-trained and unfeeling designer of vulgar and commonplace buildings, although he gets as large a percentage on his commissions as the artist, has fewer of them, and will have still less as the public taste advances. The physicians, who maintain uniform rates of fees for general practice. find it advantageous to do so, the income of the abler ones being increased to their satisfaction by the greater number of their patients; yet they need to study their cases quite as much as architects do their designs, and the architects have an advantage over them, that their compensation increases with the importance as well as the number of their commissions, while physicians, unless they happen to be specialists, receive the same amount for a visit to an overfed child as to a patient in mortal extremity. Where a doctor chooses to devote himself to a certain branch, and attains recognized skill in it, he can claim a much higher rate of fees as a professed specialist, and this is already to some extent the case in architecture. The late Mr. Richardson, for example, was rarely content with five per cent commission, and found no difficulty in obtaining seven and one-half, even for buildings of great importance, and much more for many structures which young architects would be glad to undertake at the usual rate.

A SET of instructions for the planning and fitting up of public elementary schools has been published by the English Education Department. An English primary school is so completely different in nearly every respect from one of ours that the rules for planning them are of no very great value to us, but there are some interesting points. The standard width for schoolrooms is less than with us, the rules specifying eighteen to twenty feet where long desks accomodating four or more children are used, or twenty-two feet where double desks are preferred. This seems rather surprising to our notions, the long desks, or forms, having been obsolete in our schools for thirty years, while even double desks are now considered objectionable, and in the best American schools each pupil, even in the primary departments, has his tiny single desk to himself. The elasticity of the specified dimensions, again, strikes us as rather strange. If eighteen feet is wide enough for a schoolroom seated in a certain way, twenty feet must be too wide, and if twenty feet is right, a width of only eighteen must mean constant crowding and annoyance to the pupils. The convenient and comfortable dimensions of desks and aisles have with us long been settled, and the dimensions of a schoolroom are, in well-planned buildings, just such as to contain the desired number of desks and aisles, without superfluous space and without robbing any part of its standard dimensions. In regard to the height of rooms, the English code seems to have borrowed something from the recent French and German rules, and demands that all school and class rooms shall be at least twelve feet high from floor to ceiling, provided the area does not exceed three hundred and sixty superficial feet. If the area is between this and six hundred feet, the height must be thirteen feet, and if larger than this, it must be fourteen feet as a minimum, no maximum being specified. If a schoolroom is ceiled on the collar-beam and lower part of the rafters, the distance from the floor to the wall-plate must be at least eleven feet and to the collar-beam three feet more. Roofs open inside to the ridge are not favored, and, if used, must be ventilated from the ridge and covered with impervious material.

SOME of our readers may remember Signor Boni's account of the Fondaco dei Turchi, published in November, 1885. One front of this building was restored some years ago, but the other has remained until recently in the condition in which it was put after it was abandoned as a public resort, and its arcades bricked up to fit it for a place of storage, and is well known to architects by photographs, either under its own name or the absurd one which is often given it by the foreign photographers of the "Palace of Lucretia Borgia," the fact being that if this lady ever saw it at all, which is by no means certain, it must have been at least five hundred years old, and in a state of disrepair highly unsuitable to the dwelling of a cardinal's daughter. As a result of the passion for polishing up and repairing old buildings, which is just now very prevalent in Venice, the remaining front of the Fondaco dei Turchi has just been restored with such thoroughness that, as Signor Boni says, there is no longer any hope "of finding any part, even the smallest, which we may look upon with confidence as a relic of the ancient palace." As the restored front was much the more interesting of the two, its restoration is certainly a loss to picturesque architecture, and the remains of the Venetian Byzantine are now so few in number that it seems a pity to have any of them falsified by the restorer's chisel and scraper.

AMONG the good things accomplished by the Congress for the Advancement of Technical Education which met at Bordeaux last year one of the best was the public notice, given in an excellent report, presented for the commercial section by Mr. Merckling, of the importance of the schools for commercial education which are now in operation in many places on the Continent. In Germany, the leader of all countries in most matters of education, the first thought of those who see a prospect open for the development of a new industry is to prepare a course of instruction intended to fit persons for pursuing the new employment with advantage, and the result of the Imperial policy of extending German influence, whereever possible, in all parts of the world, has been to create a great demand for schools in which young men, as a preparation for employment in the new commercial enterprises, can learn book-keeping, the principles of finance, and commercial law, besides such foreign languages as will be most useful in an extended business, and the details of certain branches of manufacturing, if manufactured goods are likely to occupy an important place in the future merchants' affairs. In response to the demand, such schools or courses of instruction have sprung up everywhere, and the consequence is that as the German manufacturers, through their enterprise in establishing technical schools, have succeeded in making themselves first in the markets of the world, and even sell their goods in immense quantities to the French, their chief competitors, so the German merchants' clerks, equipped with the training of their new schools, find their way to profitable employment all over the world, and are met with in great numbers in England, where their business-like habits, and their usefulness in the foreign trade which forms a large part of the affairs of most great English merchants, gives them an immense advantage over the native clerks. Following the example of the Germans, the French have, in a quiet way, done much recently to promote commercial education, and schools for the purpose of providing such education have been established at Paris, Lyons, Marseilles, Havre and Bordeaux, while prizes, in the shape of scholarships for foreign travel, are offered by the Government to the most industrious and successful pupils. A new experiment has also been tried in France, in the opening of education of this kind to girls, Lyons having a commercial school for girls, as well as one for boys, while in Paris the great municipal school for girls has a commercial section. Considering how large a part of French retail business is carried on by women, it is certainly desirable in every way that the same opportunities for preparing themselves to manage it successfully should be open to them as to the other sex, and the Congress adjourned with a special recommendation of the girls' commercial schools to the attention of the public, and the wish that other cities might follow the example of Paris and Lyons. Before the next meeting of the Congress, which is to be held in St. Petersburg in 1888, it would be interesting to collect information in regard to our own commercial schools and business colleges, to which both sexes in this country owe so much. In some respects their curriculum is very limited in comparison with that of the German schools; but our clerks and salesmen have little use for foreign languages, and the best of our business colleges teach what they undertake to impart with remarkable success.

OPEN-TIMBER ROOFS OF THE MIDDLE AGES.—I.

"All architecture is but a glorified roof."—*Ruskin.*

"There are few features of Mediæval art in this country to which attention could be more profitably directed than the roof; for, whether applied to secular or ecclesiastical buildings, the framed and carved wooden roof is essentially English in execution and application, and is one of the most beautiful and appropriate manifestations of our national art."—*Fergusson.*

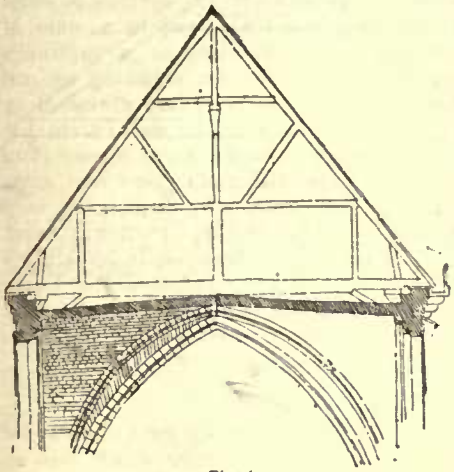


Fig. 1.
Nôtre Dame, Mantes, France. [After Johnson's "*Specimens of Early French Architecture.*"]

THE builders of the Middle Ages have left us many proofs of their skill, but none more interesting than those revealed by a study of their open-timber roofs. Certainly it is in these if anywhere that the Mediæval architects succeeded in doing what they have always been credited with doing, namely, boldly recognizing and accepting forms imposed by the exigencies of construction, and then, by artistic decoration, endeavoring to render them beautiful and harmonious. In this respect these roofs afford excellent examples of successful applications of the principle of "ornamental construction."

In design these roofs were not always scientific, but in execution they were invariably excellent. In the earlier periods it must be admitted that much was done that cannot be admired either from a constructive or an artistic point of view. It may be said of these unsuccessful efforts, however, that they are of exceeding interest as showing the many difficulties encountered and overcome, and thus, when contrasted with the beautiful works of later times, serve not to detract from but rather to heighten our admiration for those remarkable specimens of Mediæval art.

To-day, practical questions, such as expense, acoustic properties, etc., tend to prevent anything like general use as in the period of Gothic Revival, but it is still to be said that "no form of wooden covering is so good in the internal effect as the high-pitched, open roof with its massive timbers crossing and recrossing in perspective and giving mysterious shadows and half lights above."[1]

ABSENCE OF EARLY EXAMPLES.

A very noticeable feature in the history of wooden roofs is the absence of early examples, especially on the Continent. The number of examples previous to the fourteenth century is surprisingly small, though, considering the perishable nature of the material, it might be urged that the existence of any examples, not the lack of many, should occasion surprise. The existence of so few examples may be accounted for in several ways. It is largely due, of course, to the inflammable nature of the material. Though time and decay were not without their effects, fire was a far more destructive agent. One needs but to read the early history of the great cathedrals to learn how frequent and disastrous were the conflagrations of those days. The labor of years was often lost in as many hours. A material with which this was not only possible but even probable, naturally came to be held in more or less contempt. Moreover, this prejudice against timber construction was, no doubt, encouraged by that great body of workers in stone, the Freemasons. Thus, not only were many specimens actually destroyed, but also many others were not erected because of their liability to such destruction. On the Continent, except in Normandy, it is found that stone vaults were mostly used, wooden roofs being merely for the protection of vaulted ceilings, and composed of large, roughly-squared timbers, which were framed for the work they had to do without regard to their appearance (Fig. 1).

SUPERIORITY OF ENGLISH ROOFS.

In Normandy, as just intimated, wooden roofs did not give way to stone vaults to the same extent that they did in other parts of the Continent. As early as the eleventh century the Normans had made considerable progress in the construction of timber roofs. Taken in connection with several others, this fact is of considerable significance. Why is it, for instance, that timber construction received more attention in Normandy than elsewhere on the Continent? Why is it that the English roofs should be so vastly superior to those of the Continent, in fact, being unsurpassed for variety, richness and beauty? An explanation is to be found in the fact that the race origin of the English and Normans is the same and is altogether different from that of the French. Moreover, the original Normans or Northmen were a great sea-faring people, a nation of sailors and ship-builders. Now, before the Iron Age to be a nation of ship-builders was to be a nation of carpenters. The original Britons were Northmen — Angles, Saxons, Jutes. After the death of Alfred, England was conquered by the Danes or Norsemen, and shortly afterward came the Norman Conquest. The English, thus having the same race origin as the people of Normandy, naturally had the same race characteristics. Moreover, the insular position of the English was not without its influence on their national character. The English were thus a carpentering people, and to this element of their character it is easy to ascribe their superiority in timber construction to the French, who inherited no such national trend of mind.

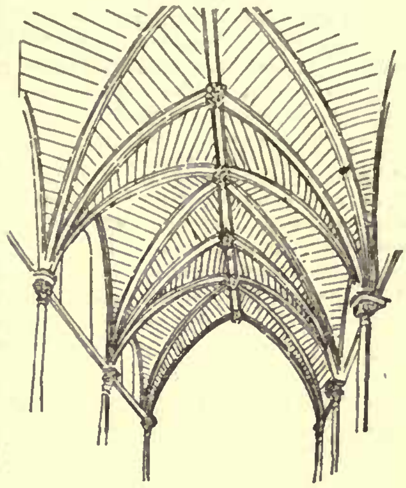


Fig. 2.
Wooden Groined Roof, Warmington, England, (1260). [After Rickman's "*English Architectural Styles.*"]

This explanation finds confirmation in the history of English Gothic architecture, a singular feature in the development of which is the constant progress from the forms of masonry to those of carpentry. The whole course of English vaulting is in fact a gradual approximation to panelling, which is essentially a characteristic treatment of wood. Fan-vaulting is quite as easily executed in wood as in stone. An example of a wooden groin vault is given in Figure 2. Such a result certainly bespeaks a carpentering turn of mind. The development of *English* open-timber roofs will, therefore, be the subject for detailed consideration, the French examples receiving merely incidental attention as they serve to illustrate intermediate steps.

WOODEN ROOFS OF ANTIQUITY.

Before taking up the English roofs, however, it will be worth while, perhaps, to briefly consider what had been done in this direction previous to the Mediæval period. The earliest and simplest form of wooden roof is that known as the tie-beam. In this form of roof (Fig. 3), two inclined rafters are framed together at the top, while they are held together below by a horizontal beam, called the tie-beam, which serves to counteract the tendency of the rafters to spread apart below and exert an outward thrust on the walls.

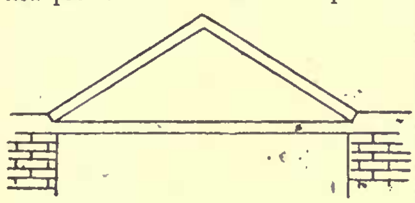


Fig. 3.

Very little is known about wooden roofs as used by the ancients: no examples, of course, remain, but, though it has been held on this account that they had none, it is probable that they were of this simple tie-beam description. There is no evidence of progress in the construction of timber roofs until the later days of the Roman Empire. Vaults were then erected that required centres of no mean construction, and basilicas were built which required roofs of large span. The Ulpian basilica is considered a typical specimen of those with wooden roofs. This was one hundred and eighty feet wide and divided into five aisles. The central one, nearly ninety feet wide, was covered with a wooden roof of semi-circular form.[2] Built largely

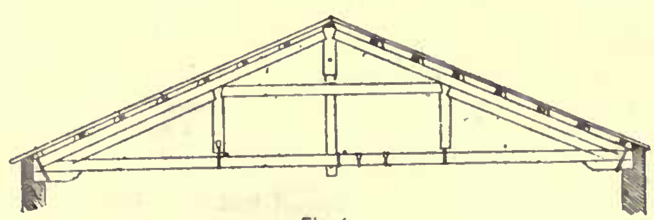


Fig. 4.
The Basilica of St. Paul, Rome. [After Tredgold.]

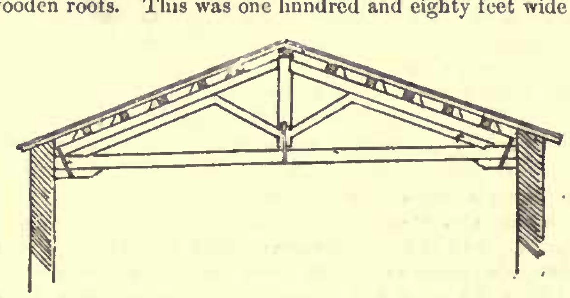


Fig. 5.
Ste. Sabine, Rome. [After Hubsch.]

[1] From an article on the "Architectural Treatment of the Roof," *Builder*, December 16, 1876.

[2] A restored section of this basilica is to be found on page 317, Vol. 1 (Fergusson).

after Roman models, the wooden roofs of the Early Christian basilicas may fairly be taken as representing Roman forms and methods. The common forms, king and queen post trusses, are shown in the accompanying figures, viz., 4, 5, 6 and 7.

These examples show just about how far the construction of timber roofs had advanced before the Middle Ages. It is evident that the principle of the truss was well understood. The use of iron straps, bolts, etc., which are not found in the Mediæval roofs, was almost necessitated by the enormous spans which were covered, some of these being twice the width of the average Gothic nave. Moreover, in most instances, these roofs were intended to support a flat ceiling, which, besides bringing additional weight on the trusses, concealed them, and consequently no attempt was made at artistic design or decoration.

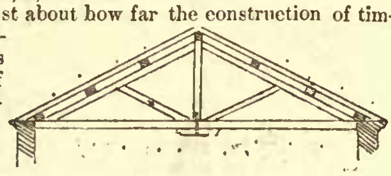


Fig. 6.

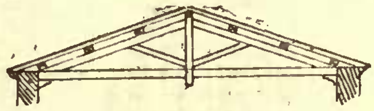


Fig. 7.
S. Lorenzo *extra Muros*, Rome. [Hubsch.]

CLASSIFICATION AND DESCRIPTION OF ENGLISH TIMBER ROOFS.

The different varieties of English open-timber roofs may be arranged in the order of their development as follows:

A. Tie-beam Roofs. { Trussed.[1] — Single Frame. / Untrussed. — Double Frame.
B. Roofs without Tie-beams:
1. Trussed Rafter. — Untrussed. — Single Frame.
2. Hammer-Beam. }
3. Collar-braced. } Trussed. — Double Frame.

Another classification would be this:
(*a*) Roofs from which the thrust or pressure is vertical.
(*b*) Roofs from which the thrust or pressure is oblique.

(*a*) and (*b*) of the latter correspond to (*A*) and (*B*) of the former classification. Practically, everything except the tie-beam roof comes in the second class (*b*) unless an exception is made of the low-pitch roof of the late Perpendicular period, the thrust of which was approximately vertical.

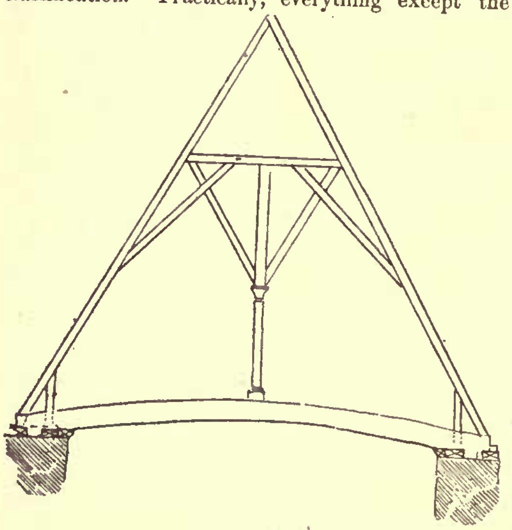


Fig. 8.
[Viollet-le-Duc.]

(*A*) *Tie-Beam Roofs.* — The science of trussing which had been so successfully applied by the Romans was lost during the Dark Ages. In the theoretically perfect truss, the load should produce no transverse strain on any part, and the pressure transmitted to the abutments should be vertical. These two essential principles of the truss are not recognized in the early Mediæval roof. The real functions of the king-post and tie-beam are often wholly misconceived. For example, the king-post is frequently found as an upright strut supported by the tie-beam (Figs. 8 and 9).

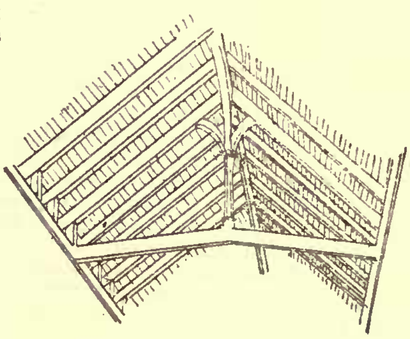


Fig. 9.
Swardstone Church, England. [Brandon.]

The primitive form of Mediæval roof, according to Viollet-le-Duc, was a simple one of the tie-beam form with a short collar-beam introduced near the apex (Fig. 10). Occasionally a short king-post was used. For small spans this served very well, but the moment the span was increased to any extent, the tie-beam had a tendency to sag. This sagging was prevented in the first instance by making the tie-beam of very large dimensions. The massiveness so characteristic of all early roofs is sometimes attributed to the abundance of material at hand, but it would seem to have been quite as much the result of methods of design then in vogue. In the course of time this tendency to deflection on the part of the tie-beam became the source of much difficulty and resulted finally in the introduction of the king-post as a tie (Fig. 11).

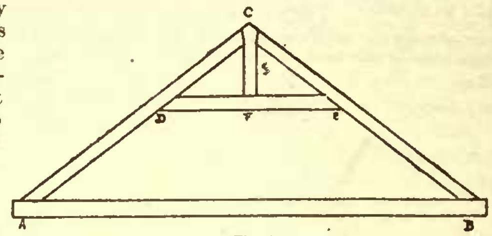


Fig. 10.
[Viollet-le-Duc.]

The first attempt to brace the rafters was decidedly unsatisfactory.

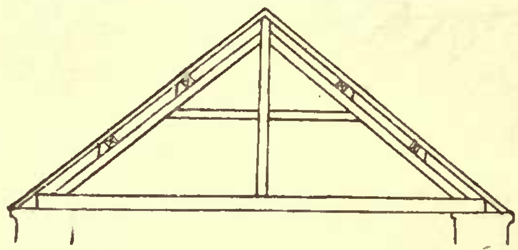


Fig. 11.
[Viollet-le-Duc.]

The manner in which this was accomplished is shown in Figure 12. The curved struts which were introduced to stiffen the rafters were themselves supported by the tie-beam. Additional strength was given to the rafters, but it was secured at the expense of the tie-beam. It was not long, however, before this method was abandoned and a better one devised. By simply reversing the position of the struts and framing them into the king-post instead of the tie-beam, a transverse strain was converted into a tensile one and a scientifically-constructed truss was obtained (Fig. 13).

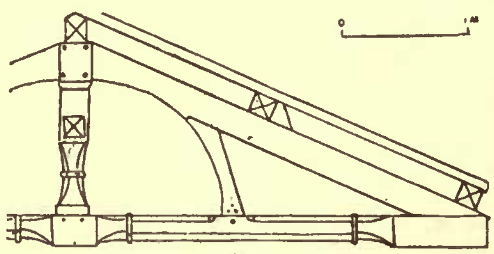


Fig. 12.
[Viollet-le-Duc.]

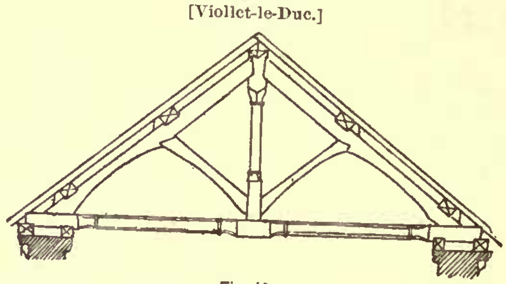


Fig. 13.
[Viollet-le-Duc.]

Most of these roofs were double-framed, that is to say, composed of two sets of rafters. The "common" rafters, which received the roofing material, rested on a framing of "purlins" that was supported at regular intervals by heavy trusses, made up of a pair of large rafters known as "principals." Such a method of construction made the roofs very heavy and necessitated the use of very thick walls, not only to support the weight, but also to give a proper bearing for the tie-beam and principals. A device for obviating this excessive thickness of wall, first found in France, was to sink the purlins into the plane of the "principal" as shown in Figure 14. Another method, which also came into general use, was to increase the pitch of the roof. It was seen that as the pitch of the roof was increased the amount of transverse strain in the rafters was dimin-

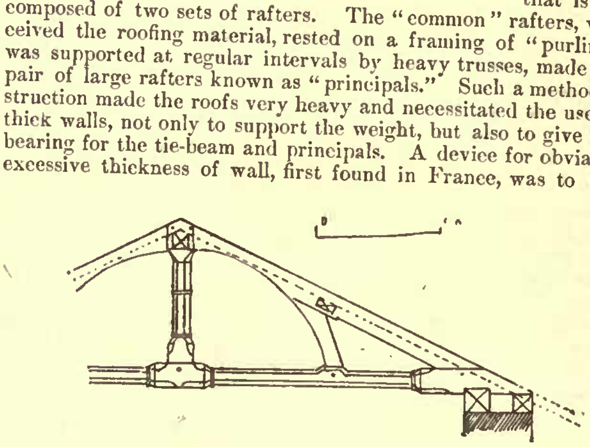


Fig. 14.
[Viollet-le-Duc.]

[1] Every roof is trussed. Either every pair of common rafters is trussed or only a few larger ones, called principals, but only is a roof technically said to be trussed in the latter case when it is supported at intervals by a pair of large rafters ("principals") which are strongly tied and braced. The bays or spaces between these "trusses" are spanned by smaller ("common") rafters.

ished, and the less transverse strain there had to be provided for, the smaller the timbers and the lighter the framing could be.

Two methods of stiffening the rafters and at the same time lessening their effective thrust on the walls merit attention. One effect of increasing the inclination of the roof was to increase the vertical distance from the inner edge of the top of the wall to the under side of the rafter (*a*, Fig. 15). By inserting a vertical strut here and framing the lower ends of both strut and rafter into a horizontal shoe

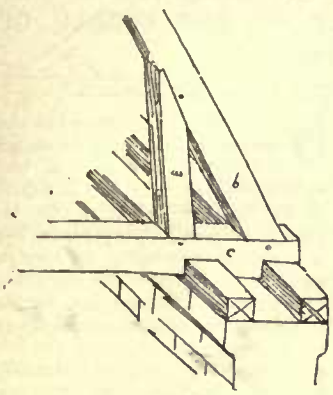


Fig. 15.

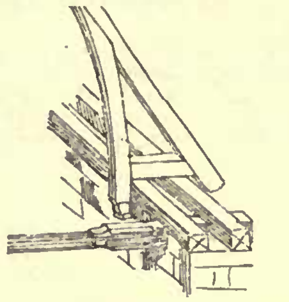


Fig. 16.

[Viollet-le-Duc.]

(*c*, Fig. 15), not only was greater stiffness given to the rafter, but its thrust was made more nearly vertical. The shoe (*c*) was sometimes made the end of the tie-beam.

When short and separate, as in Figure 17, the tie-beam was raised or arranged as in Figure 16. Both of these examples (15 and 16) are French. That shown in Figure 17 is English and differs only in the method of fixing the shoe-piece to the wall. In England, the tie-beam roof was never used to any extent, and even when it was, the proper function of the tie-beam seems to have been misapprehended. It was generally made quite independent of the other timbers; it was really nothing but a heavy beam laid across from wall to wall and used as a sort of foundation from which to build the roof. To prevent the deflection which such usage would develop, the beam had to be made of very large section. In effect this was very heavy and depressing, and so, as Mr. Street says, "the old architects were constantly varying their designs with the object of improving the construction of their roofs and very often with a view to dispensing with the tie-beam, which in many cases was felt to be an eye-sore." For example, it was almost invariably cambered in order to prevent any appearance of sagging, which is the case with a perfectly straight tie-beam (Figs. 8 and 9), and accordingly the latter is of rare occurrence. As a further means of overcoming this disagreeable effect, curved braces were often introduced (Fig. 18).

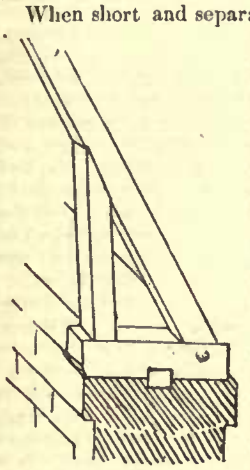


Fig. 17.

Tie-beam roofs of very low pitch were used in the Perpendicular period. Frequently the pitch is so low that it is obtained by merely cambering the tie-beam.

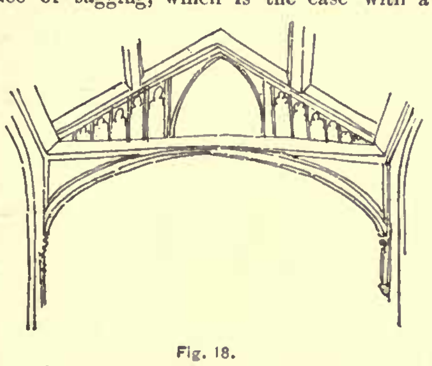


Fig. 18.
Outwell Church, England. [Brandon.]

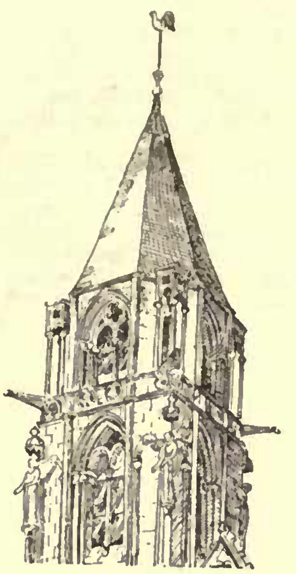
The tie-beam roof has no disturbing effect on the substructure and is simple in its construction. For utilitarian purposes, it is the best form and probably the most economical. "It can scarcely be considered as conducive to architectural effect, however. This is obtained when the tie-beam is dropped and the roof may be said to spring from, not merely rest on the walls. The structure then becomes a complete whole; walls and roof are dependent on one another; the roof becomes a part of the architecture, not a mere covering laid on."[1]

[To be continued.]

If our readers have wasted half as much time as we have in trying to find some definite illustration which we know was published in this Journal at some indefinite past time, they will be glad to know that the Decennial *Index of Illustrations in the American Architect* is now ready in book form.

[1] From an article on "Architectural Treatment of the Roof" — *Builder*, 1876.

THE THIRD EXHIBITION OF THE ARCHITECTURAL LEAGUE.



TOWER OF ST PERE sous VEZELAY, AFTER THE ARCHITECT

THE third of the annual exhibitions of architectural drawing which have, fortunately for the profession, been carried out by the energy of the New York Architectural League, is to be found in new and very pleasant quarters on the ground floor of the new building on Fifth Avenue, between the Stewart Mansion and the Caswell House, the old University Club, which has just been erected for the use of a few artists and a well-known firm of picture-dealers. Although not quite so brilliantly illuminated by day as the old galleries on Twenty-third Street, the light is pleasanter, and the arrangement of the rooms better adapted to give effect to the collection. Under these favorable circumstances the exhibition presents an appearance which we may well call remarkable, and in the brilliancy and variety of the drawings shown, the skill with which they are arranged, and the piquant interest of many of the delightful designs, the New York collection far surpasses the architectural portion of the Royal Academy exhibition in London or that of the *Salon* in Paris. Not long ago one of the English professional journals warned its British readers that their American cousins had nothing to learn from them in respect to clever sketching, and that if they did not look to their laurels, they would see them transferred across the water, and the exhibition of the present year certainly indicates that the Americans mean to get a good place when the start in the artistic race is made.

As compared with the exhibitions of previous years, the present one is, as a whole, agreeably marked by the absence of those obtrusive, elaborate and depressing colored drawings, in which a painter has done his best to infuse interest into a commonplace design, which not long ago formed the staple of such collections, and the unquestionable tendency, which this fact indicates, of the younger architects to draw and render their designs themselves, is full of promise for the future of their art. It is true that they are not always very successful in their renderings, and many consumptive, raw and sprawly sketches mingle with the others, but an architect learns more and advances faster by making a bad drawing of his own design than by "directing" the efforts of the most accomplished artists in the evolution of his idea.

To begin at the beginning, the catalogue of the exhibition is this year a little treasure, free from the grotesque proof-reading which characterized the former ones, exquisitely printed and illustrated, and bound and arranged with perfect taste. A large part of it is given up to advertisements, but it is none the worse for that, and the finances of the League are considerably better, so much so, in fact, that the continuance of the yearly exhibitions is, we understand, assured, through the success of the catalogue, in lightening the burden of expense which they entail. If we might make a suggestion which would make the next year's catalogue perfect, it would be that the illustrations should comprise a few reproductions of such beautiful decorative works as the committee was this year fortunate enough to secure.

The most conspicuous drawings to be seen in the vicinity of the entrance-door are those made by Mr. Joseph Pennell for the *Century* Company, to illustrate Mrs. Van Rensselaer's papers on the English Cathedrals. With most of the visitors these seem to be the favorites of all the drawings in the room, and they are indeed masterly, but we must confess that we did not find them quite as interesting as we expected. Some are in India-ink wash and some in pen-and-ink, the latter, which are splendidly executed, and in some portions show a good deal of that delicious tenderness which we have learned to prize so highly in Mr. Pennell's smaller works, being, to our mind, preferable to the washed drawings which have an uncomfortable air of having been drawn from photographs. Besides the main group of these, others are, with a clever purpose of relief by their broad black and white surfaces, scattered among the smaller sketches in various parts of the room. A considerable part of the colored drawings and, of course, many of the best, are by Mr. Louis C. Tiffany, whose clever sketches from nature form brilliant spots over the best-lighted wall. Next to some of these, which follow the large Pennell group, the most interesting drawing is a pen-and-ink sketch of a Romanesque doorway, executed, we think, for a Chicago club-house by Messrs. Burnham & Root. This is reproduced in the catalogue, and has already been given in the *Inland Architect* and copied in the London *Builder*, and, as a design, no less than as a masterly drawing, well deserves the high praise bestowed upon it by the editor of the *Builder*. Near this is a clever sketch of a proposed alteration by Mr. James Brown Lord, drawn by Mr. T. Rockwood Cutler in body

color, with a little transparent color in the shadows and clouds, on rough brown paper. Although very sketchy, the bare paper showing through in many places, the lines are firmly put in, so that there is no uncertainty as to the forms intended and the effect is excellent. In No. 46, near by, Mr. William Convers Hazlett gives a pretty pen-and-ink drawing, somewhat in Mr. Wright's manner, of a country house. This is one of several by the same architect, who is comparatively a new contributor to professional exhibitions, but who is honored, and justly, by having two of his works in the present one reproduced in the catalogue.

We look rather eagerly for specimens of the work of Messrs. Rossiter & Wright, and are happy enough to find several, some drawn by Mr. Wright, and others by Mr. Rossiter. It is needless to say that all are strikingly pretty, both in design and drawing, but we look with confidence to find some special treasure among them, and find it in a colored sketch, No. 129, of a house in Connecticut, by Mr. Rossiter. Such drawings as these of Mr. Rossiter's and Mr. Cutler's seem to us nearly the perfection of architectural sketches in color. More finished drawings, unless of large buildings, are apt to sacrifice either the architecture to the color, or *vice-versa*, and less finished ones often leave the architecture so indeterminate as to come barely under the head of architectural drawings at all. Among the impressionist works of this sort in the exhibition, the most conspicuous are perhaps some drawn by Mr. Clarence S. Luce, either for himself or Mr. George Martin Huss. It is needless to say that all these are pretty and taking at a distance, but on closer examination the design appears wanting. Some lines are there, not always tending to an accurate vanishing point, but they are far between, and might mean almost anything. This is the more disappointing, as all Mr. Luce's lines are precious, and one does not wish to see them economized.

We have, unfortunately, only space to mention a small portion of the works shown, but must notice a beautiful study for a tower, by Mr. John Calvin Stevens, of Portland, which well deserves its reproduction in the catalogue, and a drawing of an hotel at Orange Mountain, New Jersey, made by Mr. Hazlett for Mr. Arthur D. Pickering, which is singularly picturesque and brilliant, both as a drawing and design.

Mr. Cass Gilbert has also a pretty interior, sketched in pencil on tinted paper, with a little color over it, and a rather similar one, of a country house, heightened with white, and Mr. Stevens also some clever sketches, particularly one of a picturesque tower, which suggests Mr. Kirby. Both this, and a pair of slight drawings of a stone country house, by Mr. Wilson Eyre, of Philadelphia, are filled with the spirit of picturesque architectural grouping, which seems to flourish better in America than in any other modern country. As contrasted with these, we find an interesting series of school designs, made at the Paris School of Fine Arts by Mr. Richard M. Hunt, as well as geometrical drawings of the new portion of the Louvre, made by him as assistant to Lefuel. Just beyond, we find sketches of the successful design for the Madison Square Garden, by Messrs. McKim, Mead & White, showing the famous tower which is destined to become one of the architectural landmarks of New York, if it meets with the study which such an object claims from its designer. This reservation is perhaps the more judicious, as the interior sketch of the same building, which is shown near by, in an apology for a drawing by Mr. Hoppin, has the air of having been designed in about fifteen minutes, and drawn in about fifteen more, without even the preliminary ceremony of stretching the paper, which is drawn and "cockled" in all directions in consequence.

At this point we arrive at the entrance door of the Loan Exhibition of Decorative Art, signalized by a beautiful piece of wrought-iron, worthy of a Nuremburg blacksmith, which hangs over the door, and within we find numberless decorative paintings, stamped-leather hangings, and so on, which ought to have a separate description.

The Illustrations

[*Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.*]

THE CHURCH OF NOTRE DAME, MONTREAL, P. Q.

[Gelatine Print, issued only with the Imperial Edition.]

This building which will seat 10,000 persons was built of limestone in 1824–9. It measures 255 feet in length and 144 feet in width.

THE TAVERN, DECATUR, ALA. MR. L. B. WHEELER, ARCHITECT, ATLANTA, GA.

This building, whose interior is to be decorated by Tiffany, will cost $125,000.

THE NELSON MEMORIAL HALL, KINGSTON, PA. MESSRS. KIPP & PODMORE, ARCHITECTS, WILKES-BARRE, PA.

This building is to cost about $22,000.

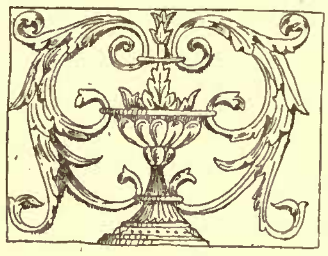
THE LOGAN OFFICES, PHILADELPHIA, PA. MESSRS. COPE & STEWARDSON, ARCHITECTS, PHILADELPHIA, PA.

HOUSES FOR J. H. CARTER, ESQ., AND FOR GEORGE L. FREEMAN, ESQ. MR. W. H. SYMONDS, ARCHITECT, UTICA, N. Y.

THE INTERIOR OF THE BARDO, TUNIS.

FOURTH ANNUAL REPORT OF THE BUREAU OF ETHNOLOGY.—I.

PICTOGRAPHS OF THE NORTH AMERICAN INDIANS.[1]



DETAIL OF TOMB CATHEDRAL OF AMIENS.

One of the bright pages in the record of what may be called the higher functions of our national Government is to be found in its fostering of scientific inquiry. We still perpetuate the iniquity of according to foreign authors no rights under our laws, and thereby discouraging native literature to the utmost; we have made an exorbitant tariff for foreign works of art, and thereby done our best to retard the æsthetic development of our country; but in its promotion of scientific investigation our Government has long since merited the admiration of the intellectual world.

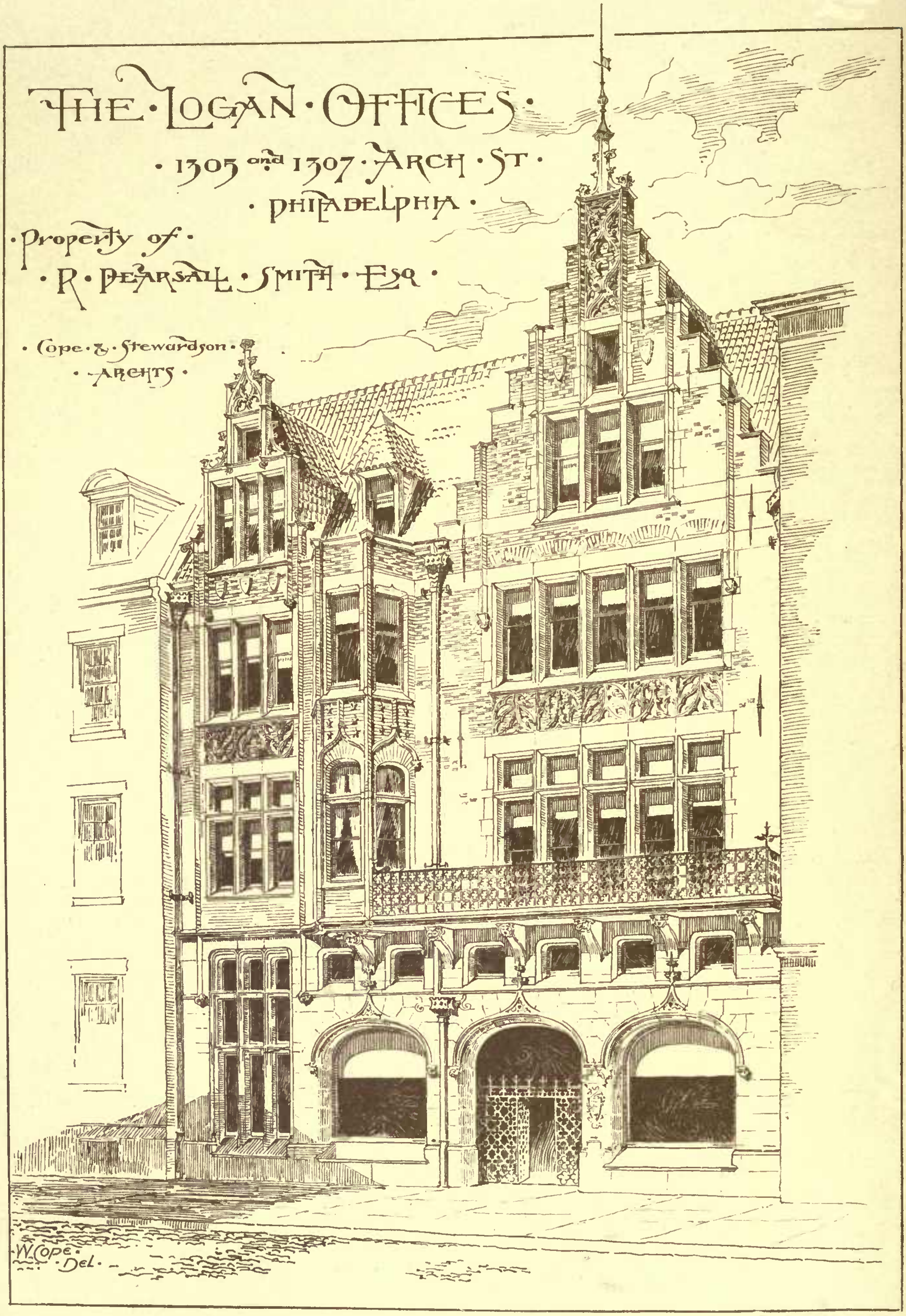
It seems particularly appropriate that a republic designed on the grandest scale yet known to be a government of man, by man and for man — to change slightly the phraseology, though not the purport, of a familiar saying — should make a special feature of the science of mankind, the youngest, and yet the greatest of the natural sciences, comprehending, in fact, all the others, and uniting them to its service. The work of the National Bureau of Ethnology, as a department of the Smithsonian Institution at Washington, is probably greater and more elaborate than any similar work conducted under the auspices or patronage of any other Government, and for its magnitude, as well as its quality, we are indebted to the scholarly mind and the energy of its director, Major J. W. Powell. The aboriginal races of America offer the richest field for ethnological investigation, and the results are certain to be of high practical, as well as scientific, value. Through the study of the so-called savage races, both in their living aspect and in the light which familiarity with present conditions throws on their archæological remains, we have the best key to a knowledge of human nature in the abstract, for it affords us the indispensable means of beginning at the very foundation which is necessary in all studies. We shall thereby be enabled to penetrate to the inner recesses of human action, motive and thought, and thus gain the means for the solution of many a mysterious problem. It is impossible to overestimate the importance of giving this knowledge into the keeping of the wisest men, and therefore necessarily the leaders, of the great nation which is to be composed of nearly all races of earth fused in a common crucible, and where the greatest problems of humanity are destined to be wrought out. For the primitive aspects of many questions of human nature and conditions which are vexing us, or are destined to vex us — such as the sociological problem — we have but to look to the wild races that still inhabit our territory, and to the records of centuries that they have left in the soil throughout the land from the Atlantic to the Pacific, and from the great lakes to the Gulf of Mexico. Here to well-trained eyes are opened chapters of knowledge which will bring about the correct understanding of many weighty questions.

The recently published "*Fourth Annual Report of the Bureau of Ethnology*" has a value in this respect which makes it worthy of its predecessors. Its elaborate illustration partially accounts for the delay in its appearance (it is for the year 1882–83), but its character makes us eager to see the four succeeding volumes now in hand. It also makes us feel the importance of instituting some system by which the scientific publications of the Government can be made more accessible to those who are most capable of appreciating them. In the first place, it should be a rule to send the reports to every public and incorporated library in the country, and to every higher educational institution, while the proposed plan of having the volumes placed on sale should be carried out. They are now largely distributed by Congressmen, like seeds from the Agricultural Department, as favors to constituents, and in great measure are pearls cast before swine. We are aware that the Bureau of Ethnology makes a special effort to get its publications into the right hands, but there is need of a regular system for the distribution of all scientific works of the Government.

The present report of the Bureau of Ethnology makes a large volume of 532 pages, comprising six papers by three contributors, with an editorial introduction by Major Powell, and is illustrated by 83 full-page plates, many of which are colored, and 564 figures in beautifully executed wood-engraving and process-work. The papers consist of an elaborate preliminary essay on "Pictographs of the

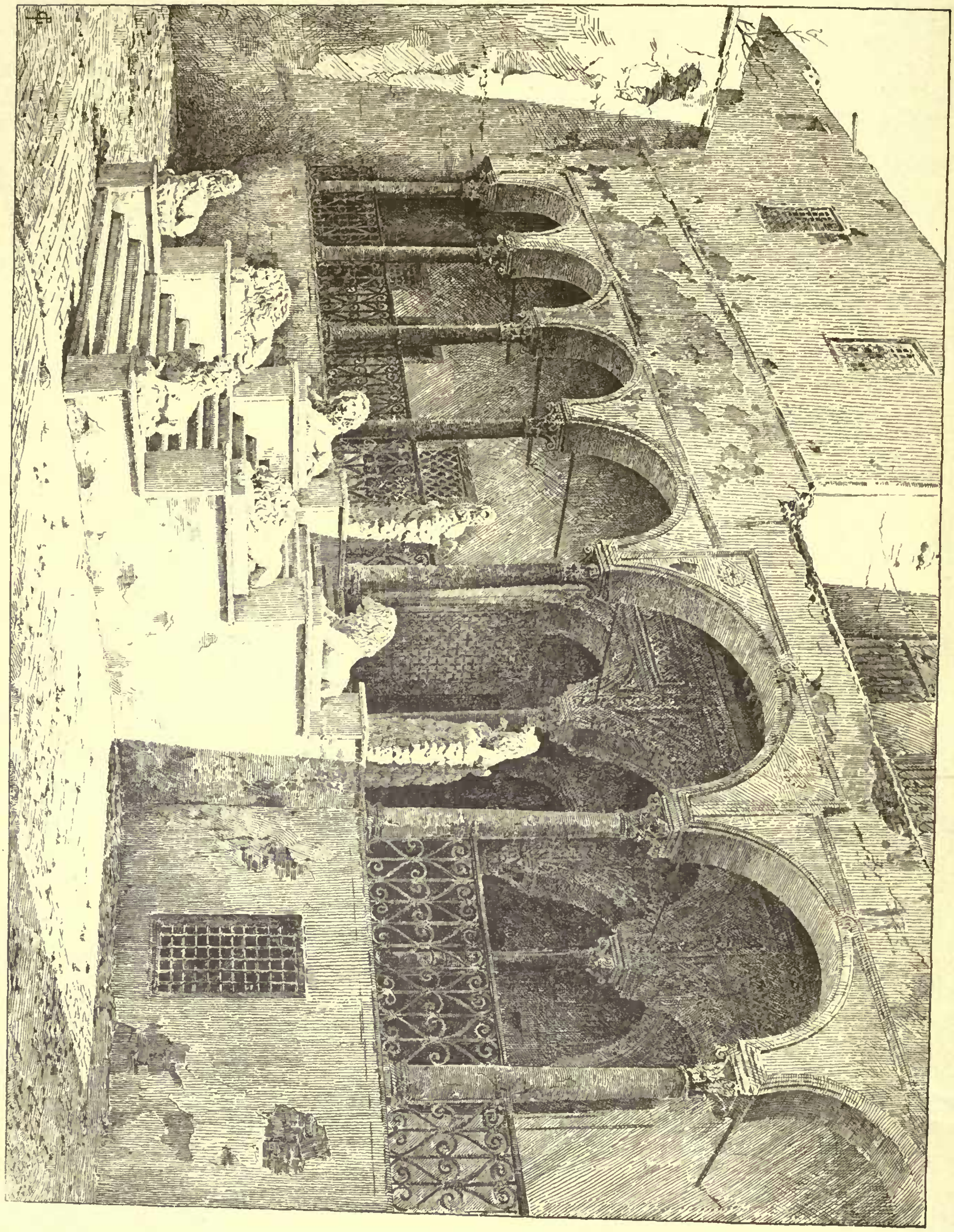
[1] By Garrick Mallery.

COPYRIGHT 1888 BY TICKNOR & Co.



Heliotype Printing Co. Boston.

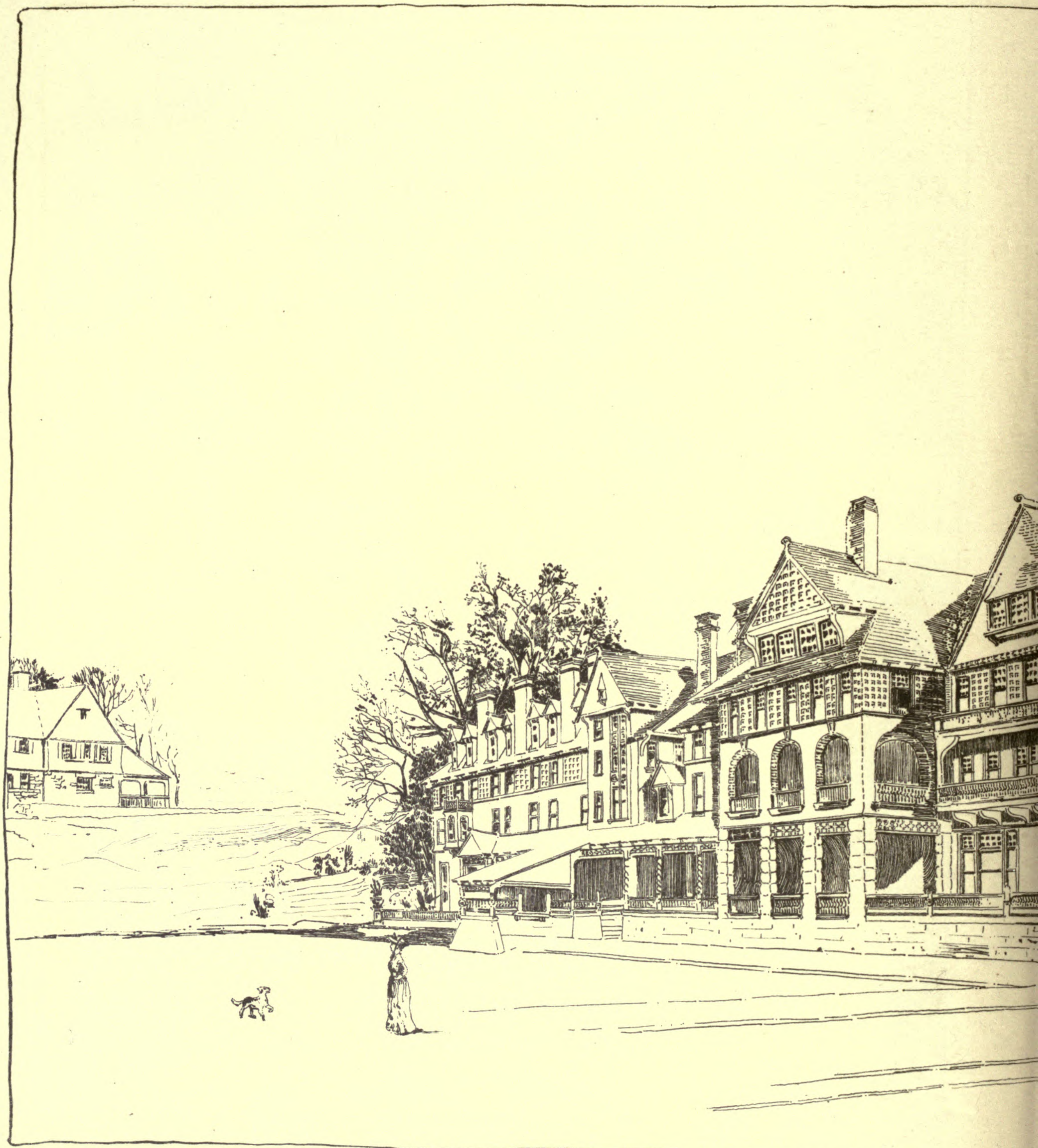
COPYRIGHT 1888 BY TICKNOR & Co



· Interior of the "Bardo" at Tunis ·

Heliotype Printing Co.

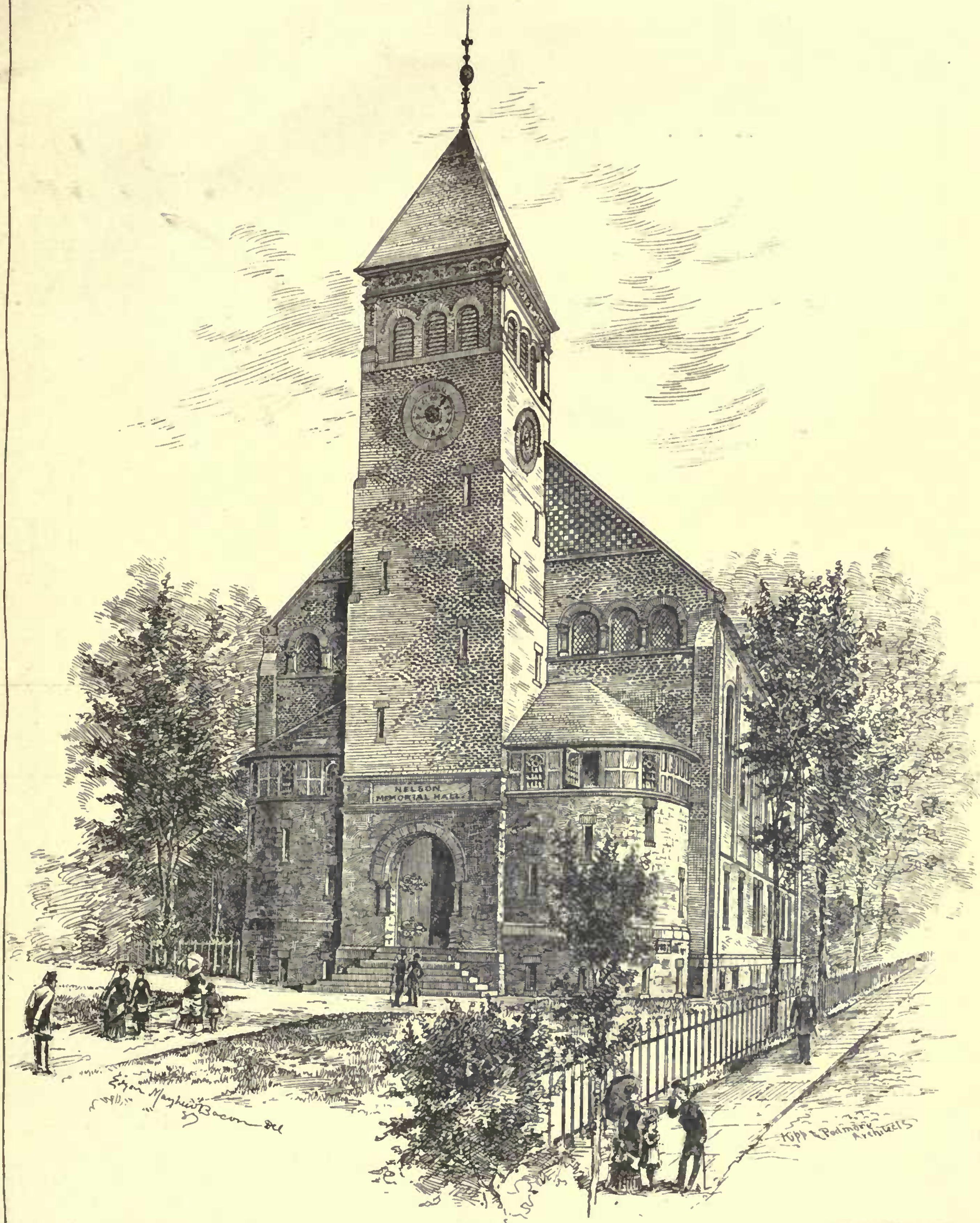
COPYRIGHT



Heliotype Printing Co. Boston.

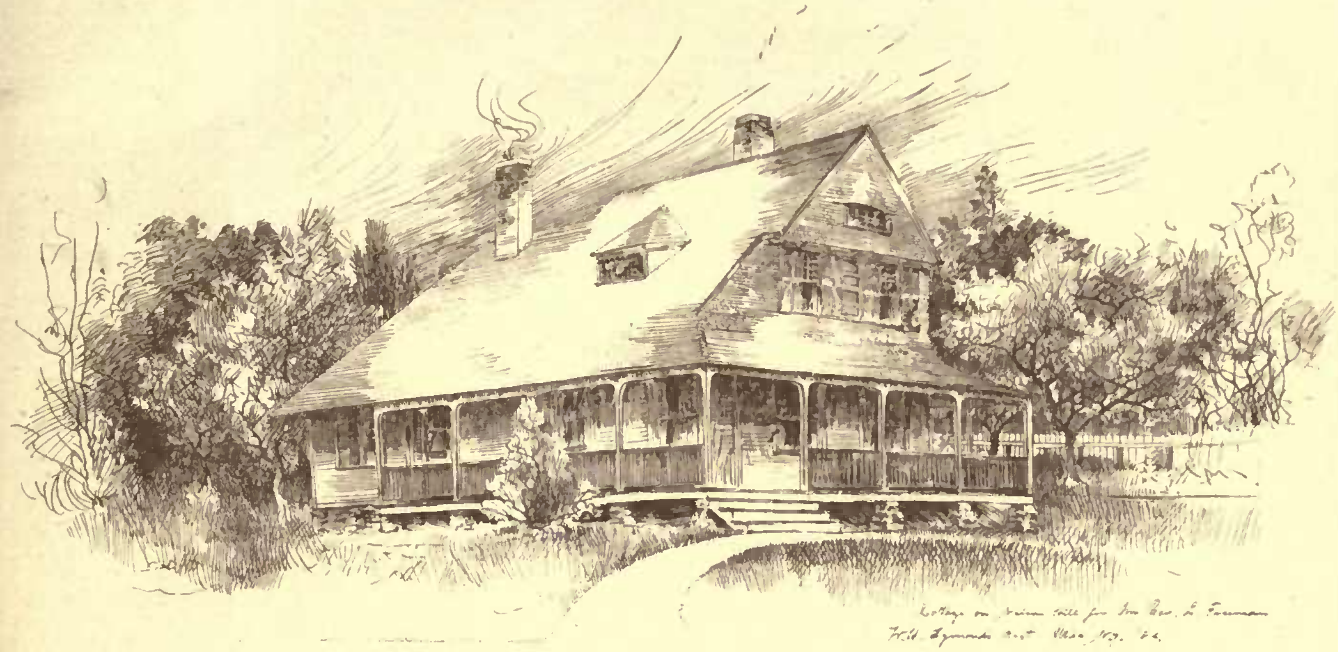
Copyright 1888 by Ticknor & Co

NELSON·MEMORIAL·HALL· KINGSTON·PA·
·KIPP & PODMORE ·ARCHITECTS·



Heliotype Printing Co. Boston

COPYRIGHT 1888 BY TICKNOR & Co



Heliotype Printing Co. Boston.

North American Indians," by Lieutenant-Colonel Garrick Mallery; Three Essays on Keramics, by Mr. William B. Holmes — "Pottery of the Ancient Pueblos," "Ancient Pottery of the Mississippi Valley," and "Origin and Development of Form and Ornament in Keramic Art;" and "A Study of Pueblo Pottery as Illustrative of Zuñi Culture-Growth," by Frank Hamilton Cushing.

These papers are a credit to American ethnological scholarship, and should furnish food for reflection to the dominant element in the American Institute of Archæology, which is disposed to see no field but that afforded by classical ground in the Old World, and which we feel inclined to hold responsible for the certainly not creditable fact that the latest number of that beautiful quarterly, the *American Journal of Archæology*, should contain but one page of notes concerning America amidst dozen of pages about the Eastern Continent. The publication thus belies its name, for there is next to nothing "American" about it, and such open disregard for its most appropriate field is adapted to give it an amateurish appearance in the eyes of European scientists. We are not disposed to underestimate the importance of classical archæology, which, however, constitutes but a very small proportion of the whole field. In fact, our very regard for the classical work makes us see the importance of the American, which affords peculiar opportunities for gaining the knowledge of the conditions out of which grew the exquisite blossom and fruit of classical culture, and which is therefore essential to a proper understanding of that culture. Neither do we urge a cultivation of the American field by Americans for so-called "patriotic" reasons, but because it is our legitimate territory, lying before our very door and beneath our feet. The disposition to regard classic archæology as alone worthy of pursuit by scholars, is a survival of the archaic habit of scientific exclusiveness long since replaced by the enlightened point of view that all branches of a science, and all sciences, are as interdependent for a correct understanding of each other and of any one, as are all the different parts of any organism to the existence of the whole and of each of those parts. Therefore the classic spirit can only be truly understood in its highest value and significance in the light of the ethnology and archæology of primitive peoples.

Major Powell's thoughtful comments on these papers aid very materially to an assimilation of their meaning and conclusions, as well as an understanding of the preceding work of their authors which led up to these. Colonel Mallery's paper is the longest, occupying the greater part of the volume with 345 pages, including illustrations. It is worthy of mention here that this paper so interested Mr. Francis Galton that he conceived and carried into execution the idea of making a series of pictographic medallions, each devoted to a leading or significant event, symbolically illustrated, in one's life, and this he suggested as a new and fascinating field for the exercise of amateur artistic talent. Such a set of medallions might be modelled or engraved, and reproduced in metal, making a beautiful chain or necklace to be preserved as an heir-loom, or given as a family present. The idea seems an admirable one, and amateurs should be grateful for it.

Indian Pictographs.

Colonel Mallery has for some years made a specialty of the study of sign-language among the Indians, and his present researches in pictography are, it may be easily perceived, intimately associated with the former, since the graphic representation of ideas is naturally akin to their representation in gesture-speech, the same fundamental principles underlying both. As Major Powell remarks, "both of these modes of conveying ideas and facts, by one of which they are also recorded, prevail among the North American Indians with a development beyond that found among any other existing peoples, and therefore the study of both developments among them is most advantageous when combined." Colonel Mallery has accumulated an enormous quantity of material on the subject, and this paper, voluminous as it is, is but preliminary to the undertaking of an exhaustive monograph. The present paper is therefore confined to a presentation of experiences and results, serving the almost vitally important purpose of communicating to others already interested in the subject the amount and character of the information so far obtained. Their coöperation is thus enlisted, and their own investigations are promoted by the suggestions received from the important work of another. The working up of theories is postponed until the collection and comparative study of the materials gathered, has been far advanced towards completion.

Here, therefore, pictographic characteristics are explained and classified, and suggestions are made for the collection, description and study of specimens. The following editorial summary by Major Powell gives a concise statement of the character of the paper: "The author has first stated the distribution in North America of pictures on rocks, either painted or incised, or both, with a few illustrative comparisons from foreign countries. He has then enumerated the instruments used at different times in pictography, together with the coloring matters employed and the methods of application. The materials upon which pictographs are made are discussed, the objects being divided into natural and artificial. The first division includes many objects, consisting chiefly of stone, bone, living trees, wood, bark, skin, feathers, gourds, horse-hair, shells, earth and sand, and the human person. Designs upon the human person are in paint and by tattooing. Under this head much information is presented for the first time, and it is compared with some recently published accounts of the process in the Pacific Islands. The subject is then considered with reference to the special purposes for which pictography has, in fact, been employed by the North American Indians. They are: 1, Mnemonic, embracing order of songs, treaties, war and time; 2, Notification, comprising notice of departure and direction, of condition, warning and geographic features, claim or demand, messages and communications, and record of expeditions; 3, Totemic: this embraces tribal, gentile and personal designations, insignia and tokens of authority, personal names, property-marks and status of individuals, and signs of particular achievements; 4, religious, comprising mythic personages, shamanism, dances and ceremonies, mortuary practices, grave-posts, charms and fetiches; 5, Customs and habits, requiring details rather than classification; 6, Tribal history; 7, Biographic, in which are examples giving continuous record of events in a life, and other cases of particular exploits and occurrences. The manner in which pictographs have long been employed by the North American Indians, showing their advance from simple objective representations to true ideographs, is then discussed, and instances are given of their expression of abstract ideas of emblems and of symbols. Indications for classification are noted by identifying the pictographers through their general style of type, and through the presence of characteristic objects. Modes of interpretation are recommended, with cautions originating in experience. Attention is invited to the important bearing of conventionalization, hints are given for avoiding errors, and, finally, practical suggestions are submitted intended to assist investigation and simplify its record. Under every heading several examples appear, with requisite graphic illustrations."

Colonel Mallery's opportunities for beginning the study of pictographs were exceptionally fortunate. His first studies were upon the remarkable pictorial chart, with which he became acquainted in the winter of 1876, represented to be a history of the Dakota Indians, but which he ascertained was not strictly historic, its purpose being to designate successive years by the most remarkable, or rather the most distinguishable, events that occurred in each. It therefore became useful chiefly as a calendar. His next study was sign-language, affording instructive parallels with the Dakota calendar and with other forms of pictography. His point of view on approaching the subject was therefore the most simple and direct. In the words of Major Powell: "There was in him no bias towards a mystic interpretation, or any predetermination to discover an occult significance in pictographs, whether on rocks, skins or bark. The probability appeared, from his actual experience, that the interpretation was a simple and direct, not a mysterious and involved process, and the course of his studies naturally tended to ascertain, collocate and compare facts, but to eschew suppositions. At the same time the author by no means denies or forgets that poetry and imagination may be discerned in the Indian pictographas as well as in their

gesture-speech and in their spoken languages. He acknowledges, and illustrates by examples given, that pictographs are, in many cases, figurative, metaphoric and symbolic. It is also recognized that, in a very few instances devices may be so far esoteric as to have been adopted as emblems, with some concealed significance, by the secret religious associations long known to have existed among the tribes. This admission is not, however, to allow of resort to mystic symbolism as a normal mode of interpretation. In the examination of pictographs of the North American Indians, so far as it has progressed, the order in which to direct interpretation is the same as that of theoretic evolution and of ascertained historic sequence. . . . The author has, therefore, presented the facts so far known to him, simply as facts. When a pictograph has appeared from intrinsic or extrinsic evidence to convey an idea beyond its objectivity, the fact has been noted. Decisive extrinsic evidence in each case is required for the adoption of mystic symbolism as the true mode of interpretation. By this method of treatment the subject of pictographs has been rescued from the limbo of morbid fancy to be marshalled with proper place in the evolutionary order of human culture."

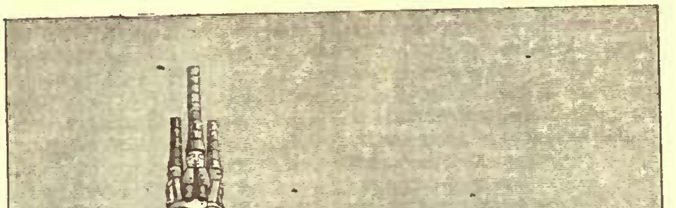
Major Powell is right in his characterization of the straining after mystical interpretations which has so long characterized, perhaps, the greater part of the attempts to study pictographs, and the methods laid down in this paper are the rational ones, which should be pursued by all serious investigators. At the same time, however, it appears likely, in view of the important part which esoteric organizations play in the life of the Indians, that pictographic devices have an esoteric significance to a greater extent than perhaps Major Powell is inclined to admit. A valuable line of research would be to pursue the lines upon which devices have grown in significance from a simple, direct and evident meaning to a complex, involved and esoterically emblematic meaning. To this end a comparison with the growth of symbolical meanings in the esoteric organizations of our own civilization will be of exceeding importance.

The study of pictographs is one of the most important factors in throwing light upon the ways and methods of thought characteristic of primitive man, and it is hardly necessary to add that for their correct study it will be found to be an absolute necessity for the student to enter into and for the time being completely identify his own mind with the habits of thought peculiar to primitive man. The failure to do this and the insistence upon carrying over to the examination of savage institutions our own civilized modes of reasoning and viewing their growth in the light thereof, is one of the most fruitful sources of the multitudinous fallacious conclusions that have characterized ethnological research — conclusions hardly more erroneous than those reached from the hasty generalizations of the traveller who deems himself competent to "size up" an alien people on the basis of the most superficial observations.

Fifty-seven pages of Colonel Mallery's paper are devoted to a description of the calendar-charts or "winter-counts" of the Dakota Indians, and among the illustrations is a beautiful colored lithograph of the famous Lone Dog calendar, painted on a buffalo robe by the Indian of that name, and representing the seventy-one winters beginning with 1800–01. This is the chart which, as aforesaid, attracted the attention of Colonel Mallery to the subject. This was the first attempt ever heard of among the Indians west of the Mississippi to establish a chronological system. This chart and its purpose was found to be well known throughout the Dakota nation, and various copies as well as similar charts were afterwards discovered.

It is believed that the chart originated in the habit maintained by Lone Dog ever since his youth, with the counsel of the old men and authorities of his tribe, of deciding upon some event or circumstance which should distinguish each year as it passed, and when such decision was made marking what was considered to be its appropriate symbol or device upon a buffalo robe kept for the purpose. The robe was at convenient times exhibited to other Indians of the nation, who were thus taught the meaning and use of the signs designating the several years in order that with the death of the recorder the knowledge might not be lost. Colonel Mallery holds that the peculiar mode of record was an invention, and not probably a very old invention, as it has not, so far as known, spread beyond a definite district or been extensively adopted. Had it been of great antiquity, it would probably have spread by intertribal channels beyond the Dakotas, where alone such charts have been found and are understood. It has been suggested that the idea might have come from contact with the whites, either missionaries or traders, but this seems improbable. "Instead of any plan that civilized advisers would naturally have introduced, the one actually adopted — to individualize each year by a specific recorded symbol or totem, according to the decision of a competent person, or by common consent acted upon by a person charged with or undertaking the duty whereby confusion was prevented — should not suffer denial of its originality merely because it was ingenious and showed more scientific method than has often been attributed to the northern tribes of America." In the Lone Dog chart, "the careful arrangement of distinctly separate characters in an outward spiral starting from a central point is a clever expedient to dispense with the use of numbers for noting the years, yet allowing every date to be determined by counting backward or forward from any other that might be known."

The name "Winter-counts" comes from the fact that the Dakotas naturally count their years by winters, the season in their high levels and latitudes practically lasting more than six months, and they say that a man is so many snows old, or that so many snow-seasons have passed since an occurrence. A few instances of the method of designation may be given. The characteristic event of the winter of 1800–01 was, according to Lone Dog, the fact that thirty Dakotas were killed by Crow Indians. The device signifying this consists of thirty parallel black lines arranged in three columns of ten lines each, the outer lines being united. In the chart made by Lone Dog, such black lines always signify the death of Dakotas killed by enemies. The next winter has for a device the head and body of a man covered with red blotches, and it signifies that there was an epidemic of the small-pox in the nation. One record calls it the "Small-pox-used-them-up-again winter." The succeeding winter is designated by a figure of a horse-shoe, which means that at that time the first shod horses were seen by the Indians, and the season is therefore known as the "Brought-in-horse-shoes winter." As a last instance may be taken the winter of 1876–77 in the chart made by the Flame. That was the winter of Custer's defeat, and in his comments on Lone Dog's chart, published in 1877, Colonel Mallery remarked: "The year 1876 has furnished good store of events for his choice, and it will be interesting to learn whether he has selected as the distinguishing event the victory over Custer, or, as of still greater interest, the general seizure of ponies, whereat the tribes, imitating Rachel, weep and will not be comforted because they are not." It turned out that two of the counts selected the event of the seizure of the ponies, and none of them yet seen make any allusion to the defeat of Custer. This is a striking fact. The disposition of our own race would of course be to chronicle a victory of such great importance, but a misfortune appears to have been a more memorable event with the Dakotas. It would be interesting to see if this tendency were a general trait of Indian character. Colonel Mallery's paper includes a valuable and elaborate communication from Dr. William H. Curbusier, assistant surgeon, U. S. A., on the subject of Dakota winter-counts, containing much of special value and importance.

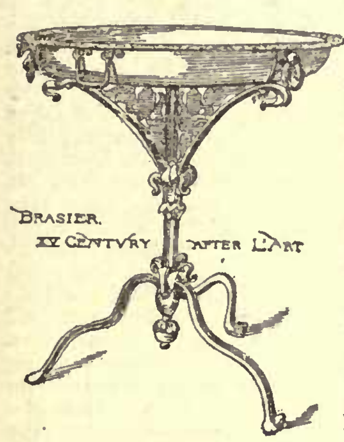

Indian Totem-Posts.

Under the head of pictographs upon the human person, there is an interesting contribution by James G. Swan on "Tattoo Marks of the Haida Indians of Queen Charlotte Islands, B. C., and the Prince of Wales Archipelago, Alaska. Some errors of Hubert H. Bancroft's history in this respect are corrected; errors inevitable in a work, valuable though it is, largely the result of compilation. Tattooing is almost universal among the Haidas, but few white people who have come into contact with them are aware of the extent to which it prevails. "It should be borne in mind," says Mr. Swan, "that during their festivals and masquerade performances the men are entirely naked and the women have only a short skirt reaching from the waist to the knee; the rest of their persons is exposed and it is at such times that the tattoo-marks show with the best effect and the

rank and family connections known by the variety of designs. Like all the other coast tribes, the Haidas are careful not to permit the intrusion of white persons or strangers to their Tomanawos ceremonies, and as a consequence but few white people, and certainly none of those who have ever writen about those Indians, have been present at their opening ceremonies when the tattoo-marks are shown." To illustrate this tattooing and its relations to other features of Haida design, a view taken at Massett, Queen Charlotte's Island, of the carved columns (totem posts) in front of the chief's residence is given and also representations of the tattoo-marks on two women and their husbands. "It is an interesting question," says Mr. Swan, "and one worthy of careful and patient investigation, Why is it that the Haida nation alone of all the coast tribes tattoo their persons to such an extent, and how they acquire the art of carving columns which bear such striking similarity to carving in wood and stone by the ancient inhabitants of Central America, as shown by drawings in Bancroft's fourth volume of '*Native Races*' and in Habel's '*Investigation in Central and South America?*' . . . The tattoo-marks, the carvings and heraldic designs of the Haida are an exceedingly interesting study, . . . they seem to me to point to a key which may unlock the mystery which for so many ages has kept us from the knowledge of the origin of the Pacific tribes."

SYLVESTER BAXTER.

PECULIAR ORIGIN OF FIRES.



WHEN it is considered that there is not a process or method of manufacture which does not contain more or less the possibility of a cause of fire, and that these various processes differ one from another in the relative hazard, then it will be conceded that there is scarcely an element in the whole range of manufacture which is not in a like manner a factor in the question of safety and of insurance. The larger amount of losses is, as would naturally be assumed, due to oil, both in consequence of its imperfect use on journals and the hot bearings which result from a lack of proper lubrication. In the mechanical processes of dyeing and bleaching there is a great deal of chemical action, which at times results in ignition. With such rapid machinery as that of the picker-room in cotton and the dusting-room in paper-mills, there is great liability of sparks; such sparks are the antecedents of fires which occur among the light, textile, fibrous material found in such machines, and enormous fires occur from other causes which certainly entitle them to be classified as among instances of proverbial happening of the unexpected.

One large insurance company in America declares that their aggregated payments for fires caused by lanterns have reached nearly $2,000,000. The causes of these fires from oil are threefold, and they are all included in what an underwriter would call the preventable cases of fires. The use of lard or sperm oil of the very dubious purity generally offered in the market is always attended with a crusting wick, and many a watchman or repairing-laborer in the night has unwittingly started fires caused by opening the lantern and picking the wick to remove the crust in order to get a better flame. For such lights, more satisfactory results are obtained by the use of what is known as the signal oil, which consists of a mixture of animal oil and mineral oil. In many places the instructions of the manager that the lantern should never be opened except in the boiler-room or some similar place of safety are carried into execution by placing spring-locks on the lantern, which cannot be opened except by a key hung up in the boiler-room.

Other fires are caused by a lamp dropping out of a lantern; any type of lantern where the lamp is placed in at the bottom is liable to such an accident, notwithstanding the method of construction may be such as to guard against that difficulty when new. In some lanterns closed at the bottom, the globe at the top is removed in such a way that the hand reaches down to the light. In others, the lamp of the lantern, although at the bottom, is secured in its place by a hinge, so that at worst, in case of any mishap, it would only swing down and not fall.

The tubular lanterns, made solely for burning kerosene, have been the source of a great many fires by reason of poor methods of construction. They are soldered by an easily-fusible alloy, and when such lanterns are hung up in places of unusual warmth and the light turned up somewhat higher than usual, the upper part of the lantern sometimes is heated sufficiently to melt the solder so that it falls apart. This is an accident entirely inexcusable when it is considered how readily lanterns are constructed without depending upon the soldered joint for the attachment of the handle to the body of the lantern, but use rivets, locked joints in sheet metal, and eyes bent in wire guards.

A curious lantern-fire resulted in the burning of an American mill, and at the same time subjected an innocent person to an unjust suspicion. The facts were that the mill very suddenly burned at an early hour of the morning, the only direct evidence upon the case being that of the watchman, who testified that while making his round he entered the upper portion of the mill, finding the room in flames, but beyond control. There were many details of circumstantial evidence connected with the fire which convinced the underwriters that the fire was incendiary in its origin, and this, coupled with the fact that the mill had not been financially prosperous for some time, and also that the proprietor did not possess a reputation above suspicion in commercial affairs as to strict integrity, diverted a great amount of suspicion towards him. This suspicion was not sustained by any direct evidence inculpating him with incendiarism, yet the underwriters refused to insure a second mill which was rebuilt on the ruins of the first. Fifteen years later the proprietor of the mill was awakened in the middle of the night by a message from a priest who was receiving the confession of the watchman now on his deathbed, and related to the priest that he had accidently set the mill on fire by breaking his lantern against a machine; fearing that he would be put in prison for the act, he had disclaimed all knowledge respecting the origin of the fire. At a later day, learning how suspicion had adverted to his employer, he dared not state the truth, although the crime had haunted his conscience for all those years. The priest refused to administer the rites of the church until the watchman's confession had been repeated to the proprietor.

Water is generally referred to as the ideal antagonist of fire, and yet there are many instances where water has caused fires, as in the case of a mill in Rhode Island, U. S., where the supply of water to an overshot wheel was regulated by an immense gate, called a leather apron, used in former days for that type of water-wheel. During the night a sudden storm raised the water in the river, and imposed an unusual pressure against the leather apron, which had become old and unsound, broke it, let a flood upon the water-wheel revolving it with unusual velocity, and ignited the mill in several places on account of the friction of the hot bearings. Another instance was that of a Connecticut mill, where the flood raised the river to a sufficient height to cover the first floor of a machine-shop to the depth of about two feet. The water rose very rapidly, and there being a large amount of iron-turnings commingled with wood-chips on the floor of the machine-shop, the iron-turnings oxidized so rapidly that the heat of the process ignited the wood and started a fire which cost the underwriters $30,000.

Fires produced by the action of water upon lime are so frequent as not to require especial notice in this reference to fires outside of the expected and well-known causes.

Streams from hose used in extinguishing fires would not ordinarily be classed among the causes of fire, yet such results have occurred is at least two instances. In the one, a stream upon a small fire also met some lime in a neighboring building, starting a fire which did not attract attention until it reached an extent threatening serious results. The other instance was in a large store in Philadelphia, where the stream of water, charged with carbonic acid gas discharged from an extincteur upon a small fire, also served as an electric-conductor, and started another fire from the arc-lighting system.

The oxidation of iron-turnings is quite frequently the cause of mysterious fires, igniting sheds used for storing scrap around iron-working establishments. There have been numerous fires in the roofs of foundries caused by explosions of melted iron thrown violently against the roof when by any mishap the iron came in contact with water.

The foundations for a light building upon a very yielding soil were arranged by placing posts down in tubs of iron-turnings set in the earth in proper situations, and then pouring over the iron a solution of salt in water. The iron-turnings rusted into a solid mass, but the process was carried on so quickly that the heat of oxidation charred the lower ends of the posts, holding them firmly, and also served as as an antiseptic treatment, diminishing the liability to decay.

The combustibility of iron is quite noticeable in tack factories, where the tacks are polished by attrition against each other on revolving cylinders, and the fine comminuted dust is so easily combustible that it has served as the source of several fires that were started from some slight accident like dropping a match or exposure to an open light.

Certain forms of fireworks, known as parlor fireworks, obtain some of their most beautiful effects from the combustion of fine iron. The sun, on the other hand, also serves its purpose as a factor of insurance. For its rays have been time and again concentrated upon combustible matter by bull's-eyes, in such a form that they crudely acted as a double convenx lens when placed over doors. It is also a frequent incident in physical laboratories, that large double convex lenses are left in such position that the sun will reach them in time and start fires. In fact as a protection against such accidents, these lenses should always be covered with a cloth bag when not in use. Dishes of tinned-iron for domestic use have also concentrated the rays of the sun, as any concave mirror might, upon combustible matter; and it is a well-known fact that two considerable fires in America, one at Lynn and the other at Sheboygan, were both caused in this manner by the tin-dishes in the window of an ironmonger's shop. There are other fires caused by peculiar circumstances comparable to that of the "arrow shot at random reaching the joint of the armor;" as, for instance a hotel-keeper, at Biddeford was so rejoiced at the election of President Cleveland, that he set off a number of fireworks in front of his hostelry in honor of the event. A

rocket shot up into the air and descended in a vertical direction into the dust chimney of a cotton-mill in the vicinity. Reaching the bottom of the shaft, it exploded, igniting the dust-room and starting a serious fire. Sparks are sometimes the cause of fires as a result of the most unexpected circumstances. In an establishment making table-knives, a milling-machine which finished the outside of the knife-handles was cleared of dust by a large tube projecting down from the room above and connected to an exhaustive blower in the attic. An emery-wheel which had been in the same position for a number of years, situated about twenty feet from this milling-machine, struck a spark against a window; thence glancing back, it rebounded some twenty feet igniting the dust in the lower part of this tube. The flame was carried by the blower to the room above and through a hole in the roof, causing a destructive fire which was not known to the occupants of the room until an alarm had been given by those who had seen it from the outside of the building.

In another instance, a spark from an emery-wheel struck the window in front of the wheel; this glancing back to the belt rebounded again, and entered a crack between the upper part of the window-frame and the masonry of the building and ignited the impalpable dust situated there, an accident which had never occurred before, although that machine had been in the same position subject to daily use for over twenty years. Although sparks from grinding-wheels frequently ignite combustible matter, yet it is a very difficult thing to do the same thing designedly even by holding fine matter, as cotton card-waste, in a line of the sparks as they are thrown off from the wheel. There have been numerous fires in cotton-mills caused by sparks from the dull-axes used in chopping hoops of cotton-bales, and yet it would be considered an impossibility if one were to take the task of setting the cotton on fire in this manner. A carpenter, while nailing a board to the ceiling in a picker-room of a jute-mill, struck a nail on one side so that it glanced across the room, entering the feeding-apron of a jute-picker and struck a spark which ignited the stock, passing through the picker, and thence spreading to a very severe fire.

The capability of steam-pipes to set fire to wood will doubtless continue to be a moot question in the face of conclusive evidence to the contrary, merely because such fires cannot be produced at will.

A few years ago a steam-pipe covering composed of wood-pulp and ground wool-waste was extensively introduced into American markets with the result of being ignited quite frequently by hot steam-pipes. There have been a few instances of the ignition of hair-felt used for such non-conductors; in the course of investigation upon some fires of that class, it was found that while the hair-felt was not combustible at ordinary temperatures, yet when it had been warmed to higher temperatures it was quite readily combustible. Fires are of frequent occurrence in drying-rooms heated by steam-pipes for seasoning small bits of lumber used in the decorative portions of cabinet-work, under circumstances which do not permit any hypothesis of spontaneous combustion, because the wood at that time has not received any treatment from oils or varnishes.

A mill in Providence, R. I., was burned by a fire originating from the steam-pipes in an unlooked-for manner. At the time of its construction, the proprietor exercised great care that all pipes should be free from direct contact with the woodwork, but when the steam was let into the pipes the expansion increased their length and pushed their end against the wood partition, which was eventually set on fire. Although the fact of fires originating from steam-pipes is well established, there is still some obscurity as to the exact subjects which produce such combustion. It is well known that the ignition point of charcoal bears a certain ratio to the temperature of carbonization; the lower the temperature the more readily combustible the charcoal, and this fact is made use of in producing charcoal for the manufacture of some grades of gunpowder by means of superheated steam. Yet applying the data which have been published upon the subject, it will be readily seen that the ignition point of charcoal produced at even the temperature of boiling water, is in excess of the heat of steam at the highest working-pressure, and yet there are instances of fires produced by steam-heating pipes at pressures as low as ten pounds and also from the heat from the kiers containing hot water used in bleaching. It seems probable, however, that the charcoal which is ignited under these conditions is not that charcoal which has been carbonized by direct contact with steam-pipes, but rather that which has been carbonized by radiation from steam-pipes, and therefore, at a materially lower temperature than that of the pipe, and then by some changes this charcoal is brought into absolute contact with the steam-pipes. Fires from spontaneous ignition of oily waste are so alarmingly prevalent that, as such, an allusion to them has no place in a list of peculiar fires. The introduction of mineral oils for lubrication has tended to reduce this class of fires materially, as the paraffin oils will not oxidize at ordinary temperature, and when commingled with animal or vegetable oils in proportions varying from one-third to one-half, it will also prevent such oxidations of the other oils contained in the mixture.

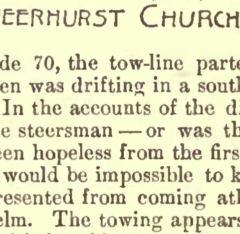
A watchman in the locomotive works in Boston was very much alarmed when, one evening, the safety-valve of the boiler, which was used only for heating in winter, began to blow off, and he learned that there was a dangerous pressure of steam in the boiler and a fierce fire upon the grates. After the fire was dulled by a stream of water, the matter was investigated, and it was found that the furnace under the boiler had been a receptacle for a lot of small bits of wood in the cleaning up of the boiler-room which followed a spasm of order on the part of the boiler-tenders; then later, some other person threw some oily waste matter into the furnace-door as the best method of getting rid of a dangerous article. A beetle flying into a mill at night became caught in a bit of sliver and straightway flying into the gas-jet, dropped and started a fire among the contents of the card-room. In another instance, a can of cotton-sliver in a cotton-mill was found to be on fire, and investigation afterwards revealed the fact that the can was in contact with the belt over the pulley, and the friction of the belt on the outside of the can produced enough heat to ignite the cotton. There are records of several similar instances. The blow-off pipe of a boiler burst, causing a back draught, and the flames coming out of the doors of the boiler-furnace set the roof on fire.

On the Pennsylvania Railroad, an exhaust blast-tube of a locomotive turned around, so that it blew a blast in the reverse direction into the furnace of the boiler, and the flames bursting out of the furnace door set the cab on fire, driving the engineer and fireman from their post to a refuge in the water-tank of the tender. The engineer, under circumstances of great bravery, came out and reversed the engine, saving the train from a total wreck, although he paid his life as a forfeit for his bravery.

One of the most peculiar fires resulting from a sequence of unhappy circumstances was that of a storehouse connected with a mill in Vermont, U. S. Oil is transported on American railways in tank-cars, in which a cylindrical tank about five feet in diameter and twenty-five feet in length is secured upon a platform-car. One of these cars was standing upon the siding of a railway near the storehouse, when one of the rear cars of a freight-train passing by on the main track jumped the switch at the siding. Numerous persons had observed that this rear car had a hot bearing, which had already ignited the oil on the journal, and, as it tore away from the train and plunged down into the oil-car, breaking the iron tank, the flames from the hot bearing ignited the oil running out from the broken tank on to the ground, and surrounding the storehouse, burned it down.

These fires are all from an American source of information, and while the conditions may not be the same to repeat the identical results in all instances among any industries, yet it is none the less true that destruction of property is quite frequent from unexpected causes, which are nevertheless preventable in their nature.—*Engineering.*

THE GREAT NOVA SCOTIA RAFT AND ITS PROGENITORS.



CAPITAL FROM DEERHURST CHURCH.

WHEN we last week again drew attention to the monster raft which left Nova Scotia on the 5th inst. for New York, we excused the brevity of our comments on the speculation till we knew whether or no the huge quantity of timber chained together would reach its destination or come to grief, as we had our apprehensions of the adventure being a risky one, and, as many expected, it has so far come to grief that it is adrift on the open ocean, entirely at the control of the elements. An easterly gale sprang up on Sunday, the 18th, and in latitude 40° 16′, longitude 70, the tow-line parted, and the raft was lost, and when last seen was drifting in a southerly direction.

In the accounts of the disaster yet to hand no mention is made of the steersman — or was there none? If so, the voyage must have been hopeless from the first, as in a contrary wind or a cross-current it would be impossible to keep an elongated mass of material as this presented from coming athwart without something in the shape of a helm. The towing appears to have been set down as too easy a job, and it is evident proper provision was not made to meet one of the land-gales, or rather, hurricanes, which are so frequently encountered along the Atlantic coast.

If it was worth while to build a raft on such a gigantic scale, it was certainly false economy to put it under the management of one steamer. This vessel, called the "*Miranda*," may have been of sufficient power to have towed the raft, but when the connection was severed by the parting of the tow-line, all control was gone till the gale subsided, and the chance of clawing hold of this floating island of wood, with seas running mountains high, became no light undertaking. The catastrophe might have assumed a less serious form had two tugs been employed, as when one line parted there would have been the other holding on, affording time for the other to again lend her help.

We shall not be a bit surprised, however, to hear that the "*Miranda*" has again picked up the raft, which, of course, in fulfilment of her contract, she will go in search of directly the gale moderates. One would have thought that a prudent commander, as soon as his line parted, would have run down to leeward of the sea-washed mass, and there ridden out the storm in comparative comfort, the huge pile of timber forming a splendid breakwater.

In severe gales, where there is danger of a ship straining, it is not unusual for those in charge to get all the spare spars lashed together and launch them overboard, secure with a strong line, and allow the

ship to drift to leeward, slacking up till the spars or raft is sufficiently far to windward to break the force of the sea.

We cannot understand why, in the storm, the "*Miranda*" continued to tow; she should have slacked up and saved the strain on her cables, keeping as near the raft as she safely could, but, of course, there may have been circumstances of which we know nothing that made it expedient for the steamer to look to her own safety, and, perhaps, after all it was a case of abandoning the raft instead of the tow-ropes parting. This view has some coloring in it from the fact that a United States man-of-war is said to have been sent in search of the "raft," but if the "*Miranda*" had not broken down, we cannot see why she was not quite as capable of looking after the raft as any other vessel.

In 1792 a raft containing about 1,000 tons of timber was built at Swan Island, in the Kennebec, by Dr. Tupper, a somewhat noted eccentric character. It was made by tree-nailing square timber together in the form of a ship's hull, and was ship-rigged, the intention being to send her across to England. At that time no manufactured lumber was admitted to the ports of Great Britain; hence the timber in the raft was simply squared with the axe, to make it stow well. The ship or raft lay at Bath for some time, it being difficult to get men to go in her. She finally went to sea, however, carrying a small vessel on her deck. But off the Labrador coast her crew became frightened by bad weather and abandoned her. She was afterwards boarded by men from a passing vessel and found to be in good order, and it was suspected that she was deserted without sufficient cause. Two other similar attempts were made from the Kennebec, and both vessels went safely across, but foundered on the English coast, under the same suspicions of fraud as in the case of the Tupper ship. In 1825 the ship "*Baron of Renfrew*" was launched at Quebec, having made a previous unsuccessful attempt, when stopped on her way, owing to the grease being consumed by fire from friction. She was towed down to the Island of Orleans and anchored. Her dimensions are given as follows: Length, 309 feet; breadth, 60 feet; depth, 38 internally and 57 externally; tonnage, 5,888 tons; draft when launched, 24 feet; cargo on board when launched, 4,000 tons of timber. She was ship-rigged, with four masts, and was perfectly flat-bottom, with a keel of about 12 inches, wall-sided, sharp forward and rather lean aft, and looked more like a block of buildings than a ship. She sailed in August, 1825, drawing 36 feet of water, in command of a Scotchman, a half-pay lieutenant in the British navy. October 27, the "*Baron of Renfrew*" drove on shore on the coast of France, near Calais, and went to pieces.

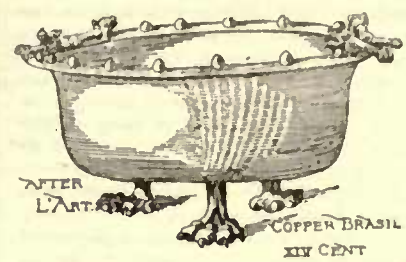
It is evident there are too many contingencies attached to rafting timber across the ocean to make it probable that any such method of transport will ever become general even if this Nova Scotia raft ultimately reaches its destination.

For the information of those of our readers who may not have retained the particulars we gave of this extraordinary structure, we may mention that the raft consists of twenty-seven thousand trees, bound together by a series of chains which connect those around the outer edges with a larger central chain, running lengthwise along the mass. The shape of the raft resembled that of a cigar, its length being five hundred and sixty feet, greatest diameter sixty-five feet, the weight of the raft being eleven thousand tons. The total cost of the raft, including timber, construction and transportation, is about thirty thousand dollars. The raft has the capacity of seventy large schooners, and the usual freight charges alone for this amount of timber are twenty-five thousand dollars. Two other rafts of the same size are now being built in Nova Scotia.

This mighty mass of timber, though estimated by some of our American contemporaries to be equal in weight and dimensions to the still "living," but not for long, wonder of the world, the "*Great Eastern*, falls far short of the bulk and capacity of that Leviathan steamship, and we are well within the mark when we state that the big steam vessel could stow all the trees in the Nova Scotia raft and a score of big shiploads besides, her burden being 22,000 tons, and her length 700 feet, and breadth over all 87 feet. The raft, it will be observed, falls far short of this, and is a long way removed from exceeding the largest ship afloat, one of Her Majest's ironclad fleet, the "*Northumberland*," being over 12,000 tons, if we take the actual burden, which in comparing with a raft of solid timber it is only fair to do. Those who have been out at sea in bad weather will fully understand the magnitude of the task the shippers of this huge mass of timber undertook, and those who have invested in the venture will wait with bated breath the news which passing vessels which have sighted the floating mass will bring. To vessels ignorant of its composition the first sight will lead them to the conclusion that they must have got out of their reckoning, whilst some amongst the superstitious might think that they had met with the great sea-serpent at last. It will not surprise us to hear some more legends of that great unknown animal conveyed to us by those whose glasses have been pointed in the direction of the "raft," when the weather was misty or a gale blowing that gave them no opportunity of taking more than a flying look. — *Timber Trades Journal.*

A SUPPORT OF THE CHURCH. — A gentleman generous in his contributions for church purposes, but not regular in his attendance upon public worship was wittily described by a clergyman as being "not exactly a pillar of the church, but a kind of a flying-buttress, supporting it from the outside." — *Exchange.*

SIX YEARS' LABOR TROUBLES.



THE Boston *Herald* presents the following abstract of Commissioner Carroll D. Wright's third annual report of the Bureau of Labor, which relates entirely to strikes and lockouts for the period of six years, ending December 31, 1886. It gives the result of the first general investigation ever made by any nation of the facts concerning strikes and lockouts for any extended period or for any wide extent of territory. The report covers about seven hundred printed pages and gives the details of each strike and lockout occurring in the United States during the period named. It exhibits the facts belonging to each industrial disturbance for each locality where trouble was found, without attempting to establish or decide upon the connection between them. The following table shows the number of strikes occurring during each of the last six years, the number of establishments involved and the average number of establishments involved in each strike:

Years.	Strikes.	Establishments involved.	Average No. of establishments involved in each strike.
1881	471	2,928	6.2
1882	454	2,105	4.6
1883	478	2,759	5.8
1884	443	2,367	5.3
1885	645	2,284	3.5
1886	1,412	9,893	7.0
Totals	3,903	22,336	5.7

In 1887 there were, according to the best information obtainable, 853 strikes, details of which are not available. The report shows that, during the six years covered by the investigation, New York had the largest number of establishments affected both by strikes and lockouts, there being for the former 9247 and for the latter 1528.

The building-trades furnished 6060 of the total number of establishments engaged in strikes. The total number of employés involved in the whole number of strikes for the entire period is shown to have been 1,318,624. The number of employés originating the strikes was 1,020,832. The number of employés in all establishments before the strikes occurred was 1,662,045, while the whole number employed in the establishments involved after the strikes occurred was 1,636,-247, a loss of 25,798. There were 103,038 new employés engaged after the strikes, and 37,483 were brought from other places than those in which the strikes occurred.

In 2182 establishments lockouts were ordered during the period named. In these there were 173,995 employés before the lockouts occurred and 169,436 after, while the number actually locked out was 159,548. There were 13,976 new employés secured at the close of the lockouts and 5682 were brought from other places than those in which the lockouts occurred.

"It should be remembered, however," says the report, "that these figures do not represent the actual number of individual establishments or different employés engaged, as in many cases there have been two or more strikes or lockouts affecting the same establishment in the same year. In such cases the establishments and the number of employés engaged are duplicated."

Of the whole number of employés involved in strikes during the six years 88.56 per cent were males and 11.44 per cent females. Of those in lockouts during the same period, 68.78 per cent were males and 31.22 per cent females.

An examination of the tables appended to the report shows that New York, Pennsylvania, Massachusetts, Ohio and Illinois represent 74.74 per cent of the whole number of establishments affected by strikes throughout the country and 90.80 per cent of the lockouts. These five States, it is stated, contain 49 per cent of all the manufacturing establishments and employ 58 per cent of the capital invested in mechanical industries in the United States. Of the 22,336 establishments in which strikes occurred, in 18,342 or 82.12 per cent of the whole strikes were ordered by labor organizations, while of the 2,182 establishments in which lockouts occurred 1,753 or 80.34 per cent were ordered by combinations of managers. Of the whole number of establishments temporarily closed for business, 13,443 or 60.19 per cent were on account of strikes; on account of lockouts, 62.60 per cent. The average duration of stoppage on account of strikes was 23.1 days and for lockouts 28 days.

The results of the strikes, so far as gaining the objects sought are concerned, are shown to be as follows: Success followed in 10,407 cases, or 46.59 per cent of the whole; partial success in 3,004, or 13.45 per cent of the whole, and failure followed in 8,910 cases, or 39.89 per cent of the whole. By lockouts 564 establishments, or 25.85 per cent of the whole, succeeded in gaining their point; 190, or 8.71 per cent partly succeeded, and 1,305, or 59.80 per cent, failed.

As to the causes or objects of strikes, it is shown that increase of wages was the principal one, 42.44 per cent. The other leading causes are given as follows: For reduction of hours, 19.45 per cent; against reduction of wages, 7.75 per cent; for increase of wages and reduction of hours, 7.67 per cent; against increase of hours, 62 per cent. Total for the five leading causes, 77.83 per cent. All other causes, 22.17 per cent.

Disclaiming absolute accuracy, the report gives the losses of employés and employers resulting from strikes and lockouts as follows: Losses to strikers during the six years, $51,816,165; loss to employés through lockouts for the same period, $8,132,717, or a total wage-loss to employés of $59,948,882. This loss occurred for both strikes and lockouts in 24,518 establishments, or an average loss of $3,445 to each establishment, or of nearly $40 to each striker involved. The assistance given to strikers for the same period, as far as ascertainable, amounted to $3,325,057; to those suffering from lockouts, $1,105,538, or a total of $4,430,595. These amounts, however, the commissioner says, are undoubtedly too low.

The employers' losses through strikes for the six years amounted to $30,732,653; through lockouts, $3,432,261, or a total loss to the establishments involved of $34,164,914.

The tables also show that the chief burden of strikes was borne by 13 industries, viz.: Boots and shoes, 352 establishments; brick-laying, 478; building-trades, 6,060; clothing, 1,728; cooperage, 484; food preparations, 1,419; furniture, 491; lumber, 395; metals and metallic goods, 1,595; mining, 2,060; stone, 468; tobacco, 2,959; transportation, 1,478. These represent 89.35 per cent of the whole number subjected to strikes. In lockouts, five trades bore 80 per cent of the whole burden, as follows: Boots and shoes, 155 establishments; building trades, 531; clothing, 773; metals and metallic goods, 76, and tobacco, 226, or a total of 1,761.

Beside completing the field-work for this report and the compilation of the information, the Bureau has carried on almost to completion the investigation begun last year concerning the moral, physical and economical conditions of the workingwomen of great cities, and has continued its investigation into the cost of the distribution of great staple products. It has also undertaken, according to Congressional instruction, the collection of statistics of marriage and divorce in the United States, a report of which may be submitted before the close of the present session of Congress.

COMMUNICATIONS

THE BEARING-POWER OF PILES.

Clay Center, Kansas, Dec. 27, 1887.

To the Editors of the American Architect: —

Dear Sirs, — In your issue of Dec. 3, 1887, you speak about a paper on the bearing-power of piling, read by Mr. Ira O. Baker before the Western Society of Civil Engineers and published in the Journal of the *Association of Engineering Societies.* I have lost the address of the Journal named. Would you please give me the address and number containing the above article.

Respectfully yours, Henry S. Maddock.

[We do not know. Our article was suggested by a reprint of the paper in a pamphlet, which, we fear, has found its way to the waste-basket. — Eds. American Architect.]

A QUESTION OF EXTRAS.

Ashland, Wis., January 7, 1888.

To the Editors of the American Architect: —

Dear Sirs, — Will you kindly advise me what is customary in the East in settlement of the following bill of extras. After the contract is let, client orders a system of indirect steam-heating to be used in the building, this necessitates the building of 54 flues 8″ x 8″ square 16′ 4″ high in the centre brick wall, the flues being put in at the time the wall was built. The contractor completes the flues according to orders, and brings in a bill for $75 for extra work. Client demurs and refers bill back to architect for adjustment. Would the amount of bricks saved be taken into account in settlement with contractor. I have a very decided opinion regarding the matter, but would like your advice before giving it. Hoping this may be of common interest to more than one young man,

I remain yours respectfully, H.

[It is customary to consider the saving of bricks in the flues as offset by the extra trouble of forming the flues properly, so that under ordinary circumstances there would be no difference in cost between a solid wall and one containing flues. In this case, however, there may have been special difficulty in arranging so many flues, or the contractor may have been put to some extra personal trouble by the change, for which, of course, he is entitled to be paid. — Eds. American Architect.]

NOTES AND CLIPPINGS

The Spanish National Theatre, Madrid. — An historical playhouse is soon to disappear from Madrid. The Spanish National Theatre, which is over 300 years old, is unsafe through age, and must be pulled down to make place for a new building, with all modern improvements. It was originally built by the monks for the performance of miracle plays, and afterwards housed an Italian pantomime troupe. The performances took place in the day, as the so-called theatre was only a walled enclosure where the spectators stood promiscuously in a paved court-yard. When Philip IV succeeded, early in the seventeenth century, a regular theatre was built, where boxes or raised seats were assigned by royal order to distinguished personages, and an entrance fee of three duros was charged. The masterpieces of Calderon and Lope de Vega were produced on this stage. — *N. Y. Evening Post.*

The Population of China. — The authorities of Pekin have recently taken a census of the Empire, and as it was for taxing purposes the proneness to disbelieve in the large estimates must be modified accordingly. The figures returned by the village bailiffs make the population 319,383,500, which together with the estimates of five provinces omitted makes the aggregate about 392,000,000. These figures are independent of the population of Corea, Thibet and Kashgar. As the population of India exceeds 250,000,000 the Hindoos and Chinese constitute more than half the entire human race. — *London Times.*

TRADE SURVEYS

The anthracite coal-strike is causing some inconvenience to manufacturers throughout the East, and threatening a great deal more. So far the blast-furnaces in the anthracite coal-fields are receiving a liberal supply of coke, and expect to continue in operation with this fuel until the strike is settled. The rolling-mills are all running as usual on bituminous coal, the supply of which is not affected at present by the strike. Pig-iron remains nominally unchanged, although some companies which are pretty well sold up have nominally advanced prices 50 cents per ton. There are no stocks to speak of, consumption having kept pretty close track on production. Standard No. 1 is $21–$22; standard No. 2, $18–$19; standard forge, $17–$18. The pig-iron makers do not feel in the least concerned over the situation, and naturally apprehend a little stiffening of prices. There is, of course, a possibility that demand may slightly fall off because of the inability of buyers to pay more money to fill old contracts taken before the present situation of affairs. Several inquiries have been made for Southern pig-iron, and no matter which way things go, an increasing demand for Alabama irons is generally anticipated this season. Coke sells at $5 at furnace, and heavy contracts have been placed within the past few days. Bituminous coal is also in active demand. Iron and steel making will go on as usual unless the supply of coke and soft coal should give out. There is fear, of course, that the Wyoming anthracite region, now in, may come out, and that the Clearfield region, now at work, may seize this opportunity to strike for the contested Columbus scale, and that the Connellsville coke-makers may take another rest, but the manufacturing interests are hoping to escape all these threatened evils through the acceptance by the Reading Company of arbitration, a measure which, it must be said, is particularly offensive to them. The bar, plate, sheet and all other iron-mills throughout New York and Pennsylvania are at work with fair orders and good prospects for the winter. An immense consumption of iron will take place this year. Locomotive-building was 25 per cent greater in 1887 than 1886, and car building was nearly one hundred per cent greater. This activity may not be repeated this year, but we do not apprehend much of a falling off. Steel-rails are quoted firm at $32 at mill. Very few orders are arriving. Buyers want supplies for next year at $30 and $31. Wages have been quite generally reduced, and buyers think this reduction ought to allow a little reduction in prices. We have been heavy buyers of foreign material for a year, and our dependence is not at end, although just now very little foreign business is being done on account of the upward tendency of prices abroad. A great deal of railroad-building will be done despite the pessimistic assertions to the contrary. The general trade outlook is good, and we feel certain that we will have an excellent year. Tariff discussions do not create as much unrest as might be supposed. The industries have had timely notice, and they are preparing to defend themselves. The heavy distribution of lumber which was kept up since May 1 until the close of the season will probably be renewed early in the spring. Much as may be said against the wisdom of prosecuting railway construction upon a large scale, the building of railroads will continue to absorb an enormous amount of capital, iron, steel, lumber and building material. Nothing but a sweeping panic can check enterprise, and prevent the building of cities and towns, the opening of mines, and the building of manufactories large and small all over the country. The impulse has been given, and newspaper-writing cannot check it. The fact that the volume of money is steadily increasing, and that there is confidence in our monetary system and that the people at large have confidence in the permanency of healthy-trade conditions all go to strengthen the belief that the business for 1888 will be, if not larger than last year, at least as large in the aggregate. In some directions there will be no doubt a falling off. In other directions there will be an expansion. Averaging the probabilities we may safely say, fully as much money will be expended this year as last, and enterprise will have as many inviting opportunities open to it. It may be too soon to say that labor will not be troublesome, and especially in view of recent disturbances in Pennsylvania and elsewhere, but if the instances which could be specified were examined into, it would be found that there are special causes at work to aggregate labor and make it apparently despotic for the time being. Taking labor all through there is a stronger conservative feeling than ever, and a clearer comprehension of the underlying intimate relationship between employers and employed. The prospects for the early spring trade are certainly favorable. Farm-products have a higher range of values. The lumber dealers throughout the country are holding their present supplies of lumber for higher prices. The lumber manufacturers in the Northwest and South are preparing to so act that they will not check the healthful influence at work. In regard to lumber itself, there will be a much heavier demand for hard-wood, and manufacturers are already preparing for it. A large amount of oak is being taken out and prepared for the mill. It is considered in lumber-trade circles there is no probability of an over-supply of oak on account of the heavy demands from furniture manufacturers, car-builders and general consumers. Walnut has perhaps seen its best days in the East, but the demand throughout the West will absorb all the surplus stocks, if there are any, and leave prices at their high notch. There is a great deal of inquiry for cherry, mahogany, poplar and ash, and the probabilities are that these woods will hold their own without any difficulty. Cypress is also coming in for a variety of purposes, as well as North Carolina sap. Yellow-pine will crowd its way farther to the front against competitors. From reports received from brick manufacturers in different parts of the country it is impossible to form an intelligible opinion as to the probable course of prices. Brick-makers insist upon and will receive higher prices. They are making ample preparations for an increasing supply, and the manufacturers of brick-machinery are also receiving orders for additional machinery and are filling extensive orders, so that so far as these indications go, it would seem the supply of brick will be equal to all demands.

S. J. Parkhill & Co., Printers, Boston.

THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. XXIII. Copyright, 1888, by TICKNOR & COMPANY, Boston, Mass. No. 630.

JANUARY 21, 1888.

Entered at the Post-Office at Boston as second-class matter.

CONTENTS

WE find ourselves in the very uncomfortable position of being obliged to apologize for the commission of an alleged wrong which we quite innocently have had a hand in. We feel called on to apologize because we readily perceive that a grievance is felt, and we speak of an alleged wrong partly because it rests on allegations that are disputed, and partly because we feel that the offence, if one exists, was committed innocently. Soon after the publication of the view of the fireplace in the "Villard house," we received a letter from the architects of the building, which declared that they and the present owner of the building were "incensed" at this publication, that the photographer from whom we obtained the negative had "no moral right to dispose of" the views, and begging us to "take some proper action in the matter." This we have done by telling our printers to destroy the edition of plates of another view in the same house — already printed for issue next week — and applying to the photographers for an explanation from their point of view, which they furnish by writing that while they regret the controversy they do not feel, inasmuch as they "obtained full permission from the residents to photograph" the rooms, that they have done any one a wrong. Since all the parties to this controversy are known to us as, in Mark Antony's words, "honorable men," we do not propose to carry our investigations farther. It is not our part to inquire into the right of the "residents" to accord permission any more than it is to discover whether the negatives were made before or after the acquisition of the property by the present owner. We can only regret that any one has been annoyed and that we have been subjected to loss. We cannot, however, shut our eyes to the fact that an interior view is not a thing that can be secured surreptitiously with a detective-camera and a drop-shutter.

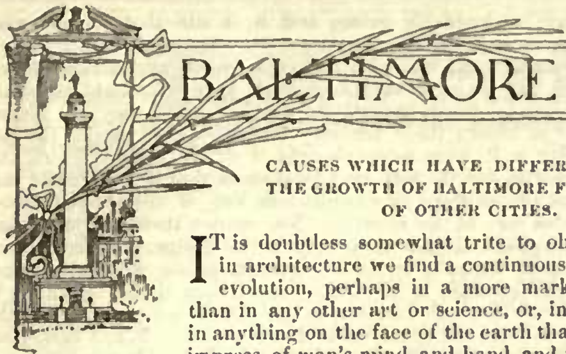
SPEAKING about photographs, we wish we had the gift of knowing beforehand whether the proprietors of interesting objects would be pleased or displeased at having their beauties held up to the admiration of the public. There are thousands of such things, belonging to private owners, the representation of which in such a publication as this would do great good in showing persons denied access to museums and collections of art what was really worthy of admiration; but, although perhaps the majority of owners are perfectly willing to be of service to the public in this way, the objections of the other sort take so pronounced a form that we are always a little afraid to mention the subject at all to persons whom we do not know.

THE current numbers of the English professional journals contain a good deal about a matter which is now engrossing to an extraordinary degree the attention of architects all over the world. It is true that they are by no means agreed on the subject, and we find earnest and able men arrayed on both sides, but the fact that instead of pursuing each his own way, independent and unmindful of all the rest, as was the rule twenty years ago, nearly all the architects worthy of the name in England, France and America are now interesting themselves in a question of professional policy, is one on which the world is to be congratulated. In the agitation of this matter — the compulsory examination of architects — the French seem to have taken the first step, with, however, less success than the English, who, while their brethren across the Channel were applying in vain to the Government to establish such an examination, took the very efficient preliminary step of requiring all applicants for admission to their own principal professional society to pass an examination prescribed by that society. The results of this movement have been so valuable that a very influential group of the younger men in the profession have drawn up a bill to be presented to Parliament, providing that after a certain date any person wishing to practise the profession of architecture must, after passing not less than five years as apprentice to a registered architect, present himself for examination, and, on passing such examination in a satisfactory manner, shall have his name registered as an architect; and that after the Act goes into operation, any unregistered person calling himself an architect shall be liable to a fine of twenty pounds for the first offence and fifty pounds for each subsequent one; that no public body shall give any professional appointment to an unregistered person; that his certificate shall have no legal value, and that he shall not have the aid of the law in recovering compensation for professional work. This is very nearly the same as the law of most civilized countries in regard to the practice of medicine, but as there is no great school of architecture in England, a term of apprenticeship is substituted for the course of study in a medical school which is required of physicians.

THIS proposition, although supported by a great many architects of high reputation, has been violently assailed by others and by some of the professional journals, the *Builder*, in particular, forgetting its usual dignity in a rather personal attack upon the "small clique" of people who have taken the trouble to bring the matter before the public, while, as mentioned lately by our English correspondent, so distinguished an architect as Mr. T. G. Jackson recently read a long paper before the Architectural Association, drawing quite a dreadful picture of the results which would follow from the enactment of the measure proposed. Leaving the merits of the case out of the question, we must say that the promoters of the bill in England have so far much the advantage in point of logic over the opposite party. They know what they think is needed, and their measure is obviously framed so as to accomplish what they consider desirable, while their opponents seem to find nothing better to meet them with than gratuitous predictions of all sorts of frightful things which, as they say, will follow from the passage of the bill. Even Mr. Jackson's paper, the most earnest and convincing that has yet appeared on the subject, begins with a glaring *petitio principii* in its very title, which calls it an essay "on the Proposal to make Architecture a Close Profession by Imposing the Test of Examination," just as if examinations for which any one could be a candidate were not the best means of opening instead of closing a profession to all who were qualified to pursue it; and goes on with arguments which give a singular idea of its author's Oxford training in logic. "Evidently," it says, "the bill proposes to adopt the restrictions of the old trade guilds and modern trade unions." It is curious to see these linked together, but to compare a measure which expressly provides that all persons who reach a certain standard of attainment shall be admitted to a profession, with the rules of bodies whose cardinal principle in their bad days was, and is now to some extent, to cut off competition by limiting the number of persons admitted to them, without regard to the qualifications of the candidates, seems about as questionable as the assertion which follows, that the result of the bill "would be that there would be fewer architects to share the same amount of work, and that poor men, however, well qualified, would be left on the outside of the door, while a golden shower of premiums would fall on those who are on the right side of it;" and "as the same fortunate persons are to have the sole right to hold public appointments, it is easy to see who would

be the gainers and who the losers by the new state of things." We suppose that Mr. Jackson must have reasoned out these dreadful consequences from the provision of the bill requiring candidates to pass through an apprenticeship, for which they would naturally have to pay, but the fact that students of medicine have to pay fees for lectures does not, in practice, cut off any "well-qualified" poor men, and still less does it bring any golden showers into the laps of those who have already taken their diplomas. In fact, the bugbear of the exclusion of the poor but worthy person who wishes to be a physician, in favor of his rich rival who can afford to pay tuition fees, has been so recently trotted around several of our own States, in which laws for the regulation of the practice of medicine were under consideration, that another of the same genus is perhaps more readily recognized here than in England, and it may be a comfort to our friends across the water to learn that the tribe has here proved to be quite harmless.

A GOOD deal more is to be said in favor of Mr. Jackson's forebodings lest a compulsory examination should be "detrimental to the pursuit of architecture as a fine art." The examination proposed would, he said, "open still wider the breach which unfortunately divides it from the sister arts of painting and sculpture, and in so doing would condemn it to a lifeless monotony and hopeless unprogressiveness." "Believe me," continued this sincere and thorough artist, "it is in the extending of an architect's skill into the decorative arts, in the closer union of himself with other artists, in the cultivation of the power to ornament his own handiwork, and so of introducing consistency and harmony into what otherwise is a mere jangle of jarring notes struck by unsympathetic hands, that the hope of architecture among us lies. The true brethren of the architect are the painter and the sculptor, not the surveyor and the engineer, and those are no longer true friends of our art who would try to persuade us otherwise." We are sure that every one who cares for his profession will subscribe enthusiastically to this view, and it is a pleasure to see it so earnestly upheld by a man who adds to it his belief that "there can be no good architecture without good building," and who has shown himself to be a consummate master in both; but we cannot help marvelling that any one should reason that because an architect should be an artist, therefore a person could not be a good architect if any one tried to find out whether he knew anything or not. For ourselves, we believe with all our heart that an architect should be a perfect artist, trained, as Mr. Jackson well says, to skill and knowledge in the arts of both painting and sculpture, as well as deeply versed in that most subtile and difficult of all the arts of expression which he himself professes; but that the true way to educate such artists is never to put them to any tests, and that the best way to select them is to take without question their own statement as to their genius, we are not prepared to admit. On the contrary, the curse of art among English-speaking nations has been for two centuries the impunity with which quacks have been permitted to parade their inventions, with beating of tomtoms and blare of trumpets, under the label of art. So far as the English are concerned, there is good reason for believing them to be in their inmost souls the most artistic people in the world, yet their very virtues have been made the means of deluding them. Unfortunately for them, one art, that of letters, is not susceptible of much change, and the English mind is always open to its charm. Knowing this, the man who wishes to bring about a revolution in artistic fashions devotes himself, not to devising something more beautiful than has been done before, but to getting the books and newspapers to say that what he has done is the most interesting, or æsthetic, or spiritual thing in existence. Then the English public rushes to admire the new wonder, and finding it, in general, ugly, concludes that what it liked before must be bad, and that conscience requires it to prefer ugliness, and, it is needless to say, real art goes into an eclipse until that particular cloud passes over, generally to suffer a new eclipse immediately after. What architect of mature years cannot verify this by thinking of the Ruskin influence? Many years ago, under Barry and the other great architects of the early part of the century, London began to be beautified with a considerable number of noble compositions, not particularly original, for even their authors were tied down to the Italian Renaissance which their books told them was the purest of styles, but well studied and good. Then arose Mr. Ruskin, and launched at them the most brilliant rhetoric that has ever been written in any language. He denounced their unoffending pediments in phrases which brought conviction to all who read them; he held up their classical frets and festoons to irresistible scorn, and described the Venetian or Lombard or French Gothic, according to his varying fancy, in terms which brought tears of tenderness to the eyes, and enthusiasm to the heart. Immediately all the traditions, the learning, the tastes and examples of the architects' offices were thrown overboard, and their owners trooped to Northern Italy, not to learn what was good, that being a liberty which they would have shuddered at the idea of allowing themselves, but to discover and copy what would please Mr. Ruskin. We all remember the result. Those of us who are old enough can recollect the admiration with which we beheld the rows of pinched little windows with cusps, the polychromatic "wall-veils" of red and black bricks, and the extraordinary towers with which our predecessors did homage to the great rhetorician who had washed their souls away by his floods of eloquence on matters which he knew very little about; and we can probably recall also the sensation of scales falling from our eyes when disenchantment came, and we looked at what had been done and saw how bad it was. Then Mr. Norman Shaw and Mr. Nesfield published their beautiful volumes of sketches, and the world turned to French Gothic as the correct thing. Mr. Norman Shaw himself, it is true, left the rest to learn the fashion from his book, and devoted himself to designing houses which were simply beautiful, without being in this, that or the other styles, but, though other people saw his work and loved it immediately, they were too intent on "correctness" to follow him, and the French Gothic from the conscientious ones, with the ugly nondescript from the careless and unfeeling ones, held the field until the delights of the Queen Anne were unfolded in another book, and the architectural world hurried off to measure and copy moulded brickwork and Dutch orders. What went on in this country meanwhile we hardly venture to describe, but the general result was that a hundred years, which might have been used for filling two countries with beautiful buildings, were thrown away in dragging architecture at the tail of literary whims. It is time for a change, and, to our mind, the surest way of accomplishing it is not, as Mr. Jackson thinks, to let every one exalt his own conceits as the purest architecture, and prevent any one from applying a test to them, but to subject the would-be designer of buildings to some sort of inquiry as to his real artistic knowledge. We should not, any more than he, wish to have a candidate for entrance into the profession judged by the designs he might make at an examination. It is universally acknowledged among architects that liberty in this respect ought to be allowed to every aspirant; but Mr. Jackson himself tells us that "the hope of architecture lies in the extending of the architect's skill into the other decorative arts," and, this being so, why should not the capacity of a candidate for responding to that hope be tested by inquiring into his skill in those other decorative arts? According to the theory which we hear often repeated by those who fear that art would lose by the examination of architects, the scientific part of the examination is useless, since architects do not use mathematics, physics or chemistry, and the artistic attainments of the candidate, which are the most important, cannot be determined in that way; or, in other words, skill in the management of light and shade, form and color, being as essential to an architect as an artist, it is necessary that he should never be asked any questions about his training in them. Moreover, as Mr. Arthur Cates well remarked, during the discussion which followed Mr. Jackson's paper, one of the chief uses of an examination is to point out to students what it is, in the opinion of the best masters of their time, necessary for them to learn in order that they, too, may be set in the way of attaining to eminence, and to prevent them, while inexperienced and ignorant of the quality of the art which they desire to profess, from wasting their time on useless or misleading studies; and if training in drawing, painting and modelling is, as we all agree, very desirable, it is all the more important that the student should have some standard in those arts set before him, to which he must attain, not by talking in a patronizing manner about them, as is now the ordinary way, but by practising them diligently under good instruction, until he can show by his work in them that he has reached that knowledge of their resources which he needs as an essential part of his equipment for the practice of that art which, in a sense, comprehends them all.



CAUSES WHICH HAVE DIFFERENTIATED THE GROWTH OF BALTIMORE FROM THAT OF OTHER CITIES.

IT is doubtless somewhat trite to observe that in architecture we find a continuous process of evolution, perhaps in a more marked degree than in any other art or science, or, indeed, than in anything on the face of the earth that bears the impress of man's mind and hand and that is not merely the result of a simple action of Nature. True, from time to time, and particularly in later days, there have appeared here and there creations certainly striking, but apparently the result of mere whim; they were things born without parentage, inheriting no character and leaving no issue. Hence, the true architectural status of any given epoch or locality can hardly be intelligently understood or criticised without a certain degree of knowledge of what has preceded it, under such influences as changes in historic, social, commercial or climatic conditions, and it is only with this preparation that we should undertake any architectural description or criticism, not only of schemes of great archæological research, which are bringing to light ruined cities from the bowels of the earth or the depths of the sea, telling marvelous tales that we involuntarily consign to the age of legend and romance, but we may apply like methods with like results to a very limited circle of time and space and to very recent years — to our own new world of America, to our own nineteenth century. So rapid have been the changes in the conditions that have affected our city architecture in the past hundred years, that what it is to-day is a very different thing from what it was in the year eighteen hundred, or even fifty, or indeed twenty-five years ago, a difference almost as great as what would formerly mark a period of several centuries or two distinct nationalities.

There is a certain amount of both profit and interest in looking back some half century, more or less, at what were the prevailing types in any one of our Eastern cities, and noting the several steps that have led us (up or down) from then to now. New York, Philadelphia, Baltimore and Boston, ranking in population in this order, were then our only cities that had rightly any claim to the name, the place of second in importance being probably disputed between the Puritan and the Quaker, while such respectable towns as Albany, Richmond and Charleston were already some distance in the rear, the national capital little more than a group of public buildings slowly rising in distant view of each other, and our great Western prodigies, at the best, merely precocious infants.

One might possibly question, however, if, in the confusion of these rapid transitions, any of our cities could rightly lay claim to any "architectural status," and also might pardonably ask what the subject has to do with a letter from Baltimore, presumably merely on matters of current interest, more or less local. It is simply from the fact that we are writing of a city which we cannot but feel does not to-day in many respects hold quite the architectural rank she should, and that perhaps she once did, among her neighboring sisters nearest her equal in size and importance. The extent of her building transactions, on the other hand, is often boasted of, or, at least, regarded as satisfactory, and in 1880, she was within her corporate limits about co-equal in population with Boston. Fifty years ago or more the difference was rather one of degree than of kind, that is (with some few exceptions) the best things in and around Baltimore were quite as good in their way, quite as substantial and well-designed, as the best in and around New York, and this notably the case in dwelling-house architecture, and the dwelling is really the architectural type that tells the story of a people more accurately than any other, being the clearer exponent of their habits and tastes, in that it is more intimately associated with their lives than any public building, secular or religious.

While, then, we find the generation of our grandfathers living in the steep and narrow but well-paved streets of Boston in houses usually built of brick, frequently combined with granite and very solid in construction, among whose characteristic features were the deeply-recessed "stoops" (leaving no unprotected steps projecting onto the sidewalks) and the rapidly-developing "swell front" — severely devoid of any decoration, or else, in the more pretentious examples, exhibiting very interesting bits of classical and colonial detail, and all more or less the natural result of local conditions; while we may note all this in the sturdy old New England city, we find a decidedly different type of house prevailing in New York, Philadelphia and Baltimore, but a much greater similarity in the style of things between those three cities themselves. Here the material was also generally brick and laid in "Flemish bond," but marble as a rule taking the place of granite. Broad steps, with iron rails, projected upon the sidewalks, or else we had the low front door of the "English basement." "Swell fronts" were rare exceptions, the houses here were somewhat broader and lower than in Boston, and there was more ornamental detail of good classical proportions often expanding into very artistic bits of decoration.

In New York the most distinctive feature has always been that everything is perhaps a little bigger and rather more of it than elsewhere, an element that was largely developed with even less commendable results in the succeeding brownstone age. In Philadelphia, we have always had the almost unbroken flatness of the entire city, the uniformly narrow streets and prevailing sameness of the houses, with the marked local characteristics of the solid white wooden outside shutters. While in Baltimore we find a great diversity of hill and level land, wider streets and more variation in the treatment of the house-front. The uniformly wide streets, and that rather in the driveway than in the sidewalk, were in some parts of the city uncalled for by the amount of traffic passing through them, often on the side of steep hills that were not inviting to vehicles, and being but badly paved with cobble stones (till within the last few years) not infrequently gave good grounds, in some spots at least, for the rumor that grass grew in their midst. The difference in the *class* of houses, with conspicuous exceptions, was likewise rather that of degree than of kind, the more pretentious and expensive being simply larger, and that rather in the number than in the size of their rooms, and containing richer details of interior finish. Baltimore, unlike her more Northern sisters had no suburbs of pleasant towns about her, nothing to correspond to Cambridge, Brookline, Roxbury and Charlestown, that cling to the outskirts of Boston: her streets gradually lost themselves in the country, after degenerating into rather unattractive highways, chiefly occupied by mechanics' houses and factories — some dozen or so of the principal avenues suddenly converting themselves into the old-time turnpike road, and, to the North, South and West stretching themselves out through most attractive country toward neighboring points of more or less importance, while to the East lay the rather uninteresting and thinly populated low-lands around the shores of the river and bay. These main roads for many miles wound on three sides of the city, branched off into a perfect net-work of picturesque lanes, recalling in many respects the rural charms of their English prototype, and led to innumerable country seats of various descriptions — "Colonial," "Italian," "Gothic" and "vernacular" — from the simple country home of five or ten acres within sight of the city spires to the more distant farms of many hundreds, where many of the citizens spent their summers, and many made their homes for the entire year.

There were no local railroads, the through lines had few stations near town, and horse-cars were unknown, hence access was obtained to all this charming country only by private conveyance, or by a few most aggravatingly slow and accommodating lines of stages or omnibuses, while the main highways were thronged with huge canvas-covered market-wagons, drawn by four, six or eight horses — bearing rows of tingling bells in their harness that could be heard half a mile away — which brought the country produce of every description into the city. Yet with these somewhat primitive characteristics Baltimore proper never had, even long before the days of which we are now speaking, anything of a rural town aspect, like, for example, her very ancient and interesting neighbor, Annapolis, who for many years had been regarding her rather in the aspect of a commercial parvenue of somewhat mushroom growth. Once you touched her boundaries you found yourself in streets that were all paved with bricks and cobble-stones, systematically laid out and closely built: few and far between were the houses that were surrounded by a garden, though not uncommonly those of the better class had reserved a side-garden of the width of the adjacent city lot, inclosed by a brick wall and usually with the view to future building improvements; in one or two streets was to be found the arrangement of high terrace as it still exists in Mt. Vernon Street, Boston, but what usually is known as the row of "Terraces" or "Villas" was nowhere seen, and frame-buildings, except of very ancient date, did not exist within the city limits.

Such was Baltimore half a century ago. She is something very different to-day. Not that the transformation is anything abnormal, or due to anything more than the natural development of a prosperous modern city, indeed her progress has not been so rapid as that of some of her sisters, and from the rapid growth of Western towns and the all-embracing policy of Boston toward her surroundings, in 1880 she had fallen from the third to the sixth place in the scale of population, and that, too, in regarding Brooklyn as only an outgrowth of New York. But, on the other hand, the census returns only include the area within her old corporate boundaries, which have not been extended for many years, and which have long been so far overrun that they now have only a legal but no visible existence, and a Bill is at this time in preparation for the Legislature to extend the limits, and to add from fifty to a hundred thousand to her population. Already her streets extend far out into what was a few years ago picturesque and sometimes almost wild country, and various lines of steam and horse-cars connect her with her rapidly developing suburban towns. We need not follow the changes that moved her centre of social fashion from Battle Monument Square up to the now central Mt. Vernon Place and far beyond, that gave her the six hundred acres of the beautiful Druid Hill Park for her pleasure-ground, and that has made her conspicuous as a literary, musical and art centre in the new light of her University, her libraries, her Peabody Institute and her Walter's Gallery; but must not fail to consider these elements in a community as important factors that necessarily influence its architecture, both directly and indirectly, and in a future letter we can look more closely at what are particular subjects of architectural interest that exist in the city as creations of to-day, or of the last few years. LEO. N.

PHILADELPHIA

SLOTHFULNESS IN ADOPTING THE MODERN ORDER OF THINGS. — EXCELLENCE OF THE BUILDERS. — OLD STONE HOUSES OF THE COLONIAL PERIOD.

In none of the older cities of this country has the architectural awakening of the last seven years produced such striking results as in Philadelphia. Not only has the actual amount of building done increased steadily since 1880,—the year's record, indeed, showing over seventy-five hundred buildings or one and three-fourths times as many as were erected in New York during the same time — but many of these are distinctly good from an architectural point of view. Some of them, in fact, are of the very best type, and many, even among the worst, show an amount of daring in design that would have amazed and very likely shocked the dwellers in the then universal red-brick and white-marble houses that have made the streets of Philadelphia proverbial for their monotony. This very monotony, by its contrast with the variety of treatment in the new style, only serves to emphasize the change that is being wrought. It took a long time, to be sure, for this change to be felt. In order to appreciate its nature and extent, it will be necessary to take a rapid glance at the past history of local building. Long after New York and Chicago had built and filled their huge office-buildings, the general opinion was that such structures were not needed here where the business part of the city was so spread out that there was no demand for great height, and where the professional men were supposed to prefer their offices in buildings having some pretensions to antiquity. Then, too, the often-quoted provincialism, or, let us say, ultra-conservatism of Philadelphians prevented them from taking anything like a general interest in architecture until some time after the Bostonians had begun to dot the reclaimed land of the Back Bay with beautiful houses and to regard the great fire in the light of an artistic windfall.

Another thing that kept Philadelphia behind the other large cities was the excellence of its builders. Instead of going to an architect, it had been the immemorial custom for one when about to build a house to consult a builder. And no wonder. These builders, capable men and admirably trained, had for the most part inherited the trade of their fathers and with it a name and a reputation that they could not afford to lose. The prospective house-builder, then, had no hesitation in leaving everything to one of these men, who would allow him, if his lot were a wide one, to have rooms on both sides of a dark entry; if the lot were narrow, on only one, while the entry was darker. The front, of course, was exactly like its neighbor's. This plan was so inevitable that one can find dozens of houses on corner lots with, say, twenty-five feet of the orthodox type of front, furnished with outside shutters and marble steps on one street and on the other sixty feet of blank wall. This extraordinary piece of planning is to be met with, it is true, in other cities, but never, I think, with such depressing frequency as in Philadelphia. And this in the city where Mr. Notman was building churches whose justness of proportion and purity of style gave them, until in comparatively late years, a place in the front rank of American ecclesiastical architecture, and where Mr. Walter was designing Moyamensing Prison and Girard College, examples of consistent architecture that are better and better appreciated in the midst of the Babel of styles that now surrounds them. For now at least the charge of Philadelphia's monotony is no longer hard to refute: a three-minutes' walk in the down-town streets will show the astonished visitor Greek and Roman temples, relics of eighty years' standing, hemmed-in by picturesque buildings of the most original character, whilst examples more or less pure of Gothic, Moorish, Italian, Renaissance, American, Classic, Romanesque, Egyptian and modern French stand shoulder to shoulder in a bewildering perspective. And cropping out here and there are quiet little bits of Colonial work, for here, as elsewhere, the revival of that unostentatious style is exerting a strong influence. No one can predict how long this fashion will continue, or whether, on the other hand, it may not be something more permanent than a fashion. It has already done good service in that it has brought about more or less harmony between the creations of different architects who are less apt than formerly to build adjoining houses of inharmonious colors and clashing styles. It may, of course, be said that an architect's work loses in individuality when confined within such narrow limits as a style like this imposes, but the old saw is still a good one, that an artist's hand is easy to recognize through whatever medium he may choose to employ. In suburban work, especially, there would seem to be a particular reason why this style should run a good chance of being more permanent than the jig-sawed Gothic of 1860 or than the later parodies on Queen Anne. For there are still left on the outskirts of the city numbers of ante-Revolutionary houses with an air of having grown up with the country such as no other type of house can boast. It is a matter of dispute whether association may not be the secret of their real charm, but that charm undoubtedly exists, and it is one that appeals very strongly to most people.

The houses, then, whose character some of our architects are striving to impress upon their own work have some local peculiarities that may be worth noting. In the first place, they are almost invariably of stone; there are very few brick ones outside the city and wooden walls were never thought of by the early builders, and very naturally, for the soft gray local stone that is easily split into lintels and sills or steps six or eight feet long, if necessary, is found all over this part of the country. No wonder then that the frame houses, exquisite though they may be in design, that have been lately built in the suburbs fill the general public with admiration, perhaps, but certainly with wonder that a man should be willing to live in a house that can never be as completely in harmony with the landscape as one built of the stone that is a part of it, and that, from the nature of the material, requires that inadmissable rejuvenator, a fresh coat of paint, for a painted house becomes shabby, but never mellow, by neglect of this concealer of old age, and a shingled wall either stained or unstained becomes black and spotty after a dozen years' exposure to the moist inland air. These old country seats, then, had enormously-thick walls, the stones in them laid flat and well, with very wide mortar-joints. The more pretentious, of course, have the face of dressed stone or are pebbled-dashed or stuccoed in the usual ways. If stuccoed, the tint is usually buff, which, with the quoins, window-heads and doorways of white marble, gives a very satisfactory effect. I have in mind a house of this character where a broad pair of marble pilasters have their bases at the water-table and their capitals at the third story.

The smaller houses, and they are by no means the least attractive, were often whitewashed over the rough stonework. It may be objected that this is a very effectual way of destroying all local color and perhaps it is, but frequent whitewashing year after year by successive generations has gradually filled the deeper hollows between the stones and rounded the too jagged projections, resulting in a most delightful surface. Here and there, in cottages of this class, may be found a hint for breaking a monotonous wall that weather-boards necessarily preclude, and that is the embedding in the masonry of a stray bit of carving or even of a prettily-veined slab of marble. The carving, for that matter, is generally execrable, although one can sometimes find a fragment from the hand of those Italian workmen who were so universally employed for fine work in marble, wood and, with sorrow be it said, in putty at the beginning of the last century. The long pent-eaves, with their plastered soffits, that give such a delightful air of comfort and solidity to the houses on a village street, are much better appreciated by the architects than by the owners of the present time, many of whom, with about as much reason as a man who should cut off his eyelashes, are pulling down these picturesque protectors against the storms of winter and the summer's sun.

If I have dwelt at such length on the advantages of the old Pennsylvania house for this part of the country, it is because the presen revival of Colonial architecture seems to have taken a strong hold on the community. If it is to be the prevailing style for some years to come, why not have it, at least, consistent? We are lucky enough to have before us examples of early work that were the result of adapting as well as possible the materials at hand to the ideal aimed at. This result is a local style of some beauty and undeniable practical fitness. Why, then, should not those of our architects who work in this vein take up the style where the colonists left off and adapt it to their present aims, instead of building expensive houses of wood (that came to be used in New England for exactly the same reason that stone was used here — its cheapness) because the owner wants his house to look like So-and-So's at Mt. Desert, or covets for his own cottage the delicious silver gray that the salt air has given to the Newport shingles?

The "Great Eastern's" Fate. — The "*Great Eastern*," the biggest ship ever built since the world began, a living monument to the skill and enterprise of the English nation, constructed on the River Thames within a few miles of the biggest city on the surface of the globe, is at length to be broken up for old iron. We can hardly believe it, and till the work of demolition has actually begun we shall still cherish the hope that some other destiny will await her. It will be recollected that this ship was designed by Brunel, the younger, in 1858, at Millwall, the constructor being Scott Russell, was launched after considerable delay sideways into the Thames, and afterwards employed in the passenger trade between New York and Queenstown. She assisted to lay the first Atlantic cable, but after many vicissitudes was found to be too costly to keep employed, her expenditure being always in excess of her earnings. She was first intended for a transport, being capable of carrying 20,000 troops, but the authorities never had occasion to use her. During the Civil War in the States President Lincoln made an offer for her, but it came to nothing, and now, after so many ups and downs, she is to go to the ship-breakers, having been purchased by a firm of metal brokers for £16,000. She is now lying in the Clyde, where the work of destruction is arranged to commence. If this is carried out no greater phenomena of the nineteenth century will appear in the historical records than the construction and destruction of this leviathan steamship. — *Timber Trades Journal.*

NEW·YORK.

REFLECTIONS SUGGESTED BY THE EXHIBITION OF THE ARCHITECTURAL LEAGUE.

THE Third Annual Exhibition of the New York Architectural League suggested certain considerations as to the tendencies and prospects of our present architectural art which it may be interesting to note before the recollections of it be gone. Many of the best-known architects sent drawings, and, as a whole, the exhibition may be considered fairly representative, since it served to indicate the general drift of our architectural designing, while at the same time it showed very clearly some of the dangers that surround the course of all good art and that, necessarily, seem to threaten the younger men.

Compared with similar exhibitions abroad, there was a praiseworthy absence of pompous, over-finished drawings. There was nowhere to be seen that kind of elaborate rendering of which the prodigious labor is almost painful to contemplate. In its place was shown throughout a great knowledge of the short-cuts in rendering, with a snap and vigor of draughtsmanship, frequently a telling use of color, and almost invariably an effective play of values that gave to the whole exhibition an air of cheerfulness and artistic vitality that was most agreeable. There was also a propriety of design, a successful adaptation of the architectural treatment to the surroundings, and an evident comprehension of the artistic problem in each case to be solved, that were all indicative of great general improvement in our architecture, considered as a fine art.

The very exuberance, however, shown in the methods of presenting the subjects, and the clever artifices of draughtsmanship have their disadvantages as well as their more visible good qualities. The chief of these disadvantages is that the clever drawings are very apt to misrepresent the subject, be that subject a bit of interior detail or a sketch of a cottage in the fields. They can be deceptive in that while the cottage, for example, as seen by this attractive drawing, looks a graceful and picturesque structure, yet it may, perhaps, appear in execution only a commonplace effort after all.

The good draughtsman has it in his power to invest the drawing of even the baldest construction with an apparent amount of interest that the actual building may lack by reason of the hardness of the lines, the uncompromising stiffness of the planes, or an unsympathetic coldness that is ever to be feared, but all of which the draughtsman can disguise by his rendering. That effective little touch of intense black in the angle of the gable will be replaced in the most exasperating way by a prosaic shadow running smoothly down to the eaves and persistently refusing to get itself bunched up to emphasize the peak as it should "according to the plans and specifications."

So frequently is skilful rendering a great and misleading factor that many of the best-managed competitions have been freed from its influence in pure self-defence, by excluding all rendering whatsoever and going back to simple outline as the only means of getting an unbiassed comparative idea of different schemes. In fact, "*chic*" must necessarily be discarded for purposes of study whenever a piece of work is attempted with a serious intent to make it unusually good, drawing and architecture being entirely dissimilar things. It has even been true in great ages of painting that the greatest masters, though always full of subtlety of hand and facility of execution, have ever kept these in their true position as accessories only to the general effect and to the higher end in view. Decadence has set in as soon as the greater object has been lost sight of in the mazes of manual dexterity. It may even be contended that a building which will not look handsome when inartistically drawn will be unlikely to look so in execution, no matter how striking the brilliant drawing may make it appear. For purposes of study, therefore, the client should desire the apotheosis of the office-boy, since it is often such unimaginative drawing as his that represents the effect of the executed work on the unprofessional eye.

Too much praise cannot be given to the beautiful drawings of many who use their gifts in the true way, making them stepping-stones to higher things. The good draughtsmanship of these men assists to a better knowledge of what they would attempt, and by its very picturesqueness serves as a fruitful mine of suggestions in their endeavor to attain their ideal.

The most encouraging sign of the exhibition was not that any particular men had made such great strides in advance, though this was, happily, true, but that the general practice has made a very real progress in the right direction. In the direction, that is to say, of work that fulfils the necessary requirements of well-ordered and sensible structures, together with those higher and more abstruse qualities of beauty and æsthetic fitness which are necessary to be attained before such work can be regarded as entering into the higher realms of artistic effort. Did our advancement rest only on the work of a few men, there would be little hope, for a long time, of our getting within even measurable distance of the great ages, since these were always the result of many minds working together and by their mutual influence and corrections tending toward some general result. Fortunately, however, this small number of drawings is enough to show that, with all the individual differences and sometimes caprices, there is undoubtedly a pretty clearly-defined unity of object, for to make the building suitable for its purpose and to make it *look* so, are surely among the elements of good architecture, and these qualities, though long unattained, are now oftener attained, and what is of great consequence, are almost always striven after.

We can see also, getting clearer and clearer every year, a general tendency toward such qualities of design in architecture as shall be compatible and harmonious with the highest efforts of painting and sculpture; getting from them their best results, so that while the paintings and sculpture shall decorate and enliven the architecture, the architecture shall perform its highest function in uniting these, adding to their dignity and largeness of effect, and forming with them one magnificent whole.

All this must necessarily be viewed by the light of the criterion of excellence, and the present age is, in many ways, the poorest of all in the accumulated traditions that go to make such a criterion. Ancient races invariably made large use of color a factor, but so strangely does this strike the modern mind, that only within comparatively late years has it been fully admitted that the Greeks were actually in the habit of overlaying even white marble with color. Every little while some fresh piece of evidence has been surprising the world, by showing their practice in this respect, such, for example, were the completely colored statues found in Athens. The almost unbroken line of tradition and evolution from the earliest dawn of art to the Renaissance, seems to have nearly stopped then, and we can only learn the principles of our predecessors from close study of incomplete examples. But the use of color in architecture, or rather the actual conception of a true-colored architecture, is something of which the higher conditions are nearly absent from the practice of to-day.

Some sketches made in Japan, were among the most precious things in the exhibition when regarded in their relation to all that the world ought to know about the possibilities of colored architecture, but of which it has, unfortunately, lost so much valuable tradition. These sketches show us how rich, and yet dignified, while really in good taste even the smallest structure can be when colored on principles to which the weight of many experiences gives an authority not to be expected from inexperience. A little shelter over a well, a few posts upholding a roof — that is all: it is simply carved, but magnificently colored and gilded till it looks like some bird of paradise resting on the green lawn among the shady pines. Our best efforts seem but amateurishly timid after one has been impressed by the charm of such work. Marvellous as is the interior of St. Mark's at Venice, yet it cannot be considered as an isolated artistic effort; the smaller churches of its day, without such a wealth and overabundance of rare marbles at their command, must yet have attained to a great beauty of color, otherwise there could not be developed the experience necessary to make of St. Mark's such a masterpiece. How different seem these conceptions of a building, entirely colored, with all its statues and bas-reliefs and paintings thus brought into unity and forming all together one tremendous effect, from that of a mass of white marble, glaring in the sunshine and chilling in the rain, such as would be the Greek temple so far as our actual traditions picture it.

With all the recent advance in architecture, it is quite evident that there is a long path yet to be travelled before the work in this country can attain to the standard of much that was done, and done in the natural course of things in past centuries.

Even now a sketch of old work is to be distinguished at a glance among sketches of modern work. The old designers seemed to get more frequently at a complete solution of how to unite dignity with grace, and not stray into the pitfalls of affectation on every side.

Our young men coming back, as most of them do, from abroad, with natural enthusiasm for what they have seen and studied, set at once about emulating the spirit of that work. Many of the designs show evident traces of this desire, which is surely one in the right direction. But underlying the whole question are the general principles, from the expression of which the old work derives a great part of its charm.

The manor-houses of France, for example, are picturesque in the extreme, with their varied outlines, bold massing and exquisite arrangements of detail, all making an effect that seldom fails to be agreeable when seen with its proper surroundings of every kind. But many of the characteristics of similar examples would be utterly incongruous when appropriated for our buildings. If a modern dwelling be made to look forbidding and inhospitable, no matter how cleverly done, it certainly cannot be in harmony with the best side of our present life. It offends us because we are no longer obliged to live shut up in gloomy fortresses, and fascinating as at the moment, it may be to twist the facts into such an appearance, a more mature consideration will condemn the effort as essentially inartistic. The Italian Renaissance, even admitting it to have been fostered by desire to imitate, and by admiration of classical models, was very far from attaining literally such a result.

The men of the Renaissance had in mind a persistent conception of what would be appropriate to the time, and used classical devices while imprinting this character on their work: and it should not be otherwise, for the world had changed, had grown older, and saw things from a different of view — and so the most classical work of the early cinque cento, when the tutelage of Rome and Greece was

direct, as yet something in it that is not antique, but that indicates the thoughts and habits of a different race of men, and a changed condition of life. This ever holds good, and the really artistic work must be that which interprets what is best in the thoughts and lives of our time, not that which reproduces most quaint conceits.

Having few traditions coming to us as the heritage of the past, there must, to take its place, be more careful study of the buildings which incorporate our lost birthright. L.

THE ART INSTITUTE, ITS WORK, ITS EQUIPMENT AND ITS BUILDING.

THE formal opening a comparatively-short time since of the new Art Institute Building marks in art matters the longest step forward that has ever been taken in Chicago, and from Chicago's influence as a great centre it certainly records a most important epoch in the history of art in the West. The opening evening, in spite of wind and weather, was still in every way a most notable success; friends of art, not only in Chicago, but elsewhere, loaned many choice works, which, with the possessions of the Institute itself, formed a most splendid collection for the first exhibition. In this building, aside from the permanent collection—even now well worth a visit—it is intended to have a constantly-changing exhibit, as well as several annual exhibitions of more or less importance. Already one gentleman has offered a perpetual annual prize of two hundred and fifty dollars, and two more of like amount are being arranged by friends of the Institute. These, together with special school prizes for work of the students, form a liberal commencement of a prize fund. The collections are open to the public every week day, and the constant stream of visitors, especially on Saturday (the free day) testifies that people thoroughly appreciate the advantages furnished.

Five or six years ago a small brick building, now a wing of the present edifice, was built, but it was recognized as a fact that in all probability a good many years would elapse before any steps would be taken towards the construction of the main building. However, a young and prominent Board of Trade member put himself at the head of the movement and, early and late, advocated the cause of the Institute. He went among the rich citizens and because of his own wealth and position and by the generosity with which he himself gave, he fairly forced money from the pockets of many who possibly might not have been as generous to a poorer or more humble petitioner. So at last, thanks to his zeal and energy, the building is now finished and thrown open to an appreciative public.

The collection of antique casts, due to the generosity of a Chicago lady, will be the finest in the entire United States. Already there have been numerous presents of pictures and works of art, and whispers of more that are to come are heard on every side, so that the Art Institute, with its more than three hundred pupils, will certainly very shortly have a tremendous influence on art not only in Chicago but in the entire West.

With its large window-openings and its pointed roof, the building itself is in general outline decidedly pleasing, although its form is certainly not that of one's preconceived ideas of an art building, since it might with equal good judgment be taken for a club-house or even a produce-exchange. The architects, Messrs. Burnham & Root, have combined the different reds of the stone and the tile roof into an extremely harmonious whole, but the selection of a torso to do duty as a finial seems decidedly questionable. On account of height all its beauty—if by chance it has any—is lost, and the poor mutilated legs sticking out over the sidewalk involuntarily cause one to wonder how far the feet must have projected beyond the building-line before they were broken off by the city authorities. In fact, the greater part of the carving on the exterior of the building is simply atrocious; such work would scarcely pass muster on a warehouse, but when it is put upon a building that is supposed to represent all that is best in art, and, by its very position, does stand as the typical representative of sculpture, it becomes decidedly sickening. The plain stone would have exemplified better the old saying about beauty unadorned. Numerous medallions of celebrated artists are used as ornaments and it is commonly reported, and many people mention it with apparent pride, that these did not have to be made by any regular sculptor, but were done by a common stone-cutter and that he had nothing to do them from but small wood engravings! Certainly it is to be earnestly hoped that for the honor of Chicago sculptors they had nothing to do with them, for a worse lot of caricatures were never seen.

As regards the interior of the building, it would seem as if that careful study had not been spent upon it that the subject demanded. At present a certain portion of the building is used for purposes not connected with the Institute, and this condition of affairs will probably exist for a good many years, if not always. Under these circumstances, it would have been extremely desirable, if not a necessity, to arrange the plan so that once inside the building, these parts should be somewhat separated, though capable, at need, of being thrown together, but nothing of the kind was done. When the building was occupied, this difficulty at once became apparent, and recently a turn-stile was put up in the already much-crowded and cramped vestibule. This, of course, keeps out people who have no business in the galleries of the first floor, but at the same time it deprives the public of the stairs and forces them to use the elevator. However, this is apparently by no means satisfactory, for the elevator-boy explains, with apparent great glee, that unscrupulous people go to the second floor on the elevator and then as soon as he is out of sight slip through the railing that separates the museum department from the rooms on that floor, and so, after inspecting these galleries, boldly march down the stairs into the galleries on the entrance floor. As many of the upper rooms are rented to clubs and associations, naturally liable to come and go in crowds, an elevator of considerable capacity should have been provided, but a smaller and more cramped one than that actually installed scarcely exists in the city. When entering the galleries, people are naturally obliged to leave canes, umbrellas, etc., at the door—in this case, very literally at the door, as there is no sign of a cloak-room. They are left, sometimes checked, sometimes not, standing up against the basement stair-rail, where they can be conveniently clawed out either by oneself or by a long-suffering small boy, who, under the circumstances, cannot possibly arrange the checks in numerical order. Similarly, the means of getting from the new building to the old portion appears to have received no attention, and, in fact, no other impression can be left upon one's mind than that after arranging four or five rooms upon the first floor (and these are very nicely arranged) the rest was obliged to work itself out for the sake of the exterior, no attention being paid to the smaller but very important necessities of the building and the comfort of the people who were to occupy it.

The success of the Western draughtsmen in the recent Architectural League exhibit at New York is extremely gratifying to the younger members of the profession here, and the draughtsmen of Chicago are much elated, although they only came in second best. The encouragement thus received will surely bear fruit in more of our designers taking part in such friendly competitions and in helping to break down the feeling that many Western men have, that the people of the East are narrow-minded and not willing to give the "Wild West" even the justice that is their due.

The Illustrations

[*Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.*]

AMERICAN UNITARIAN ASSOCIATION'S BUILDING, BEACON STREET, BOSTON, MASS. MESSRS. PEABODY & STEARNS, ARCHITECTS, BOSTON, MASS.

[Helio-Chrome, issued only with the Imperial Edition.]

GOTHIC SPIRES AND TOWERS, I, II, III.—SALISBURY CATHEDRAL; ST. GILES, WREXHAM; CHICHESTER CATHEDRAL; ST. MICHAEL'S, UFFINGTON; ST. DENNIS, SILK WILLOUGHBY, ENGLAND.

[Issued only with the Imperial Edition.]

HOUSE FOR C. F. WASHBURN, ESQ., WORCESTER, MASS. MESSRS. ROSSITER & WRIGHT, ARCHITECTS, NEW YORK, N. Y.

MATERIALS, brick and light and dark Longmeadow stone, terra-cotta. Roof of black slate with red slate bands and hips. Entrance porch, stone. Interior handsomely finished in hard woods. Cost, $40,000; now building.

COMPETITIVE DESIGN FOR THE Y. M. C. A. BUILDING, PROVIDENCE, R. I. MR. HOWARD HOPPIN, ARCHITECT, PROVIDENCE, R. I.

THIS design, to which was awarded the second place, was to have been carried out in yellow brick with brownstone finish.

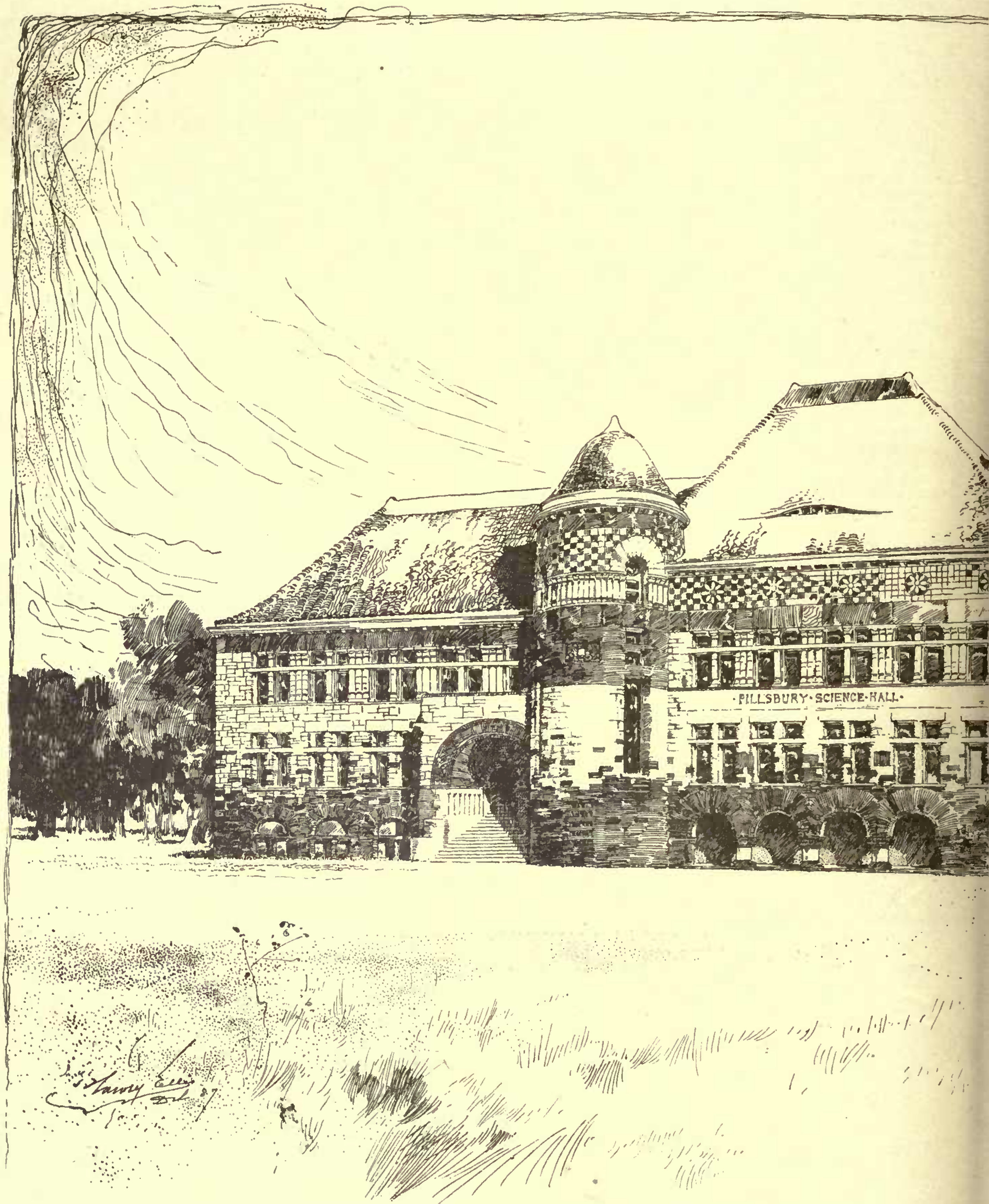
PILLSBURY SCIENCE HALL, MINNEAPOLIS, MINN. MR. L. S. BUFFINGTON, ARCHITECT, MINNEAPOLIS, MINN.

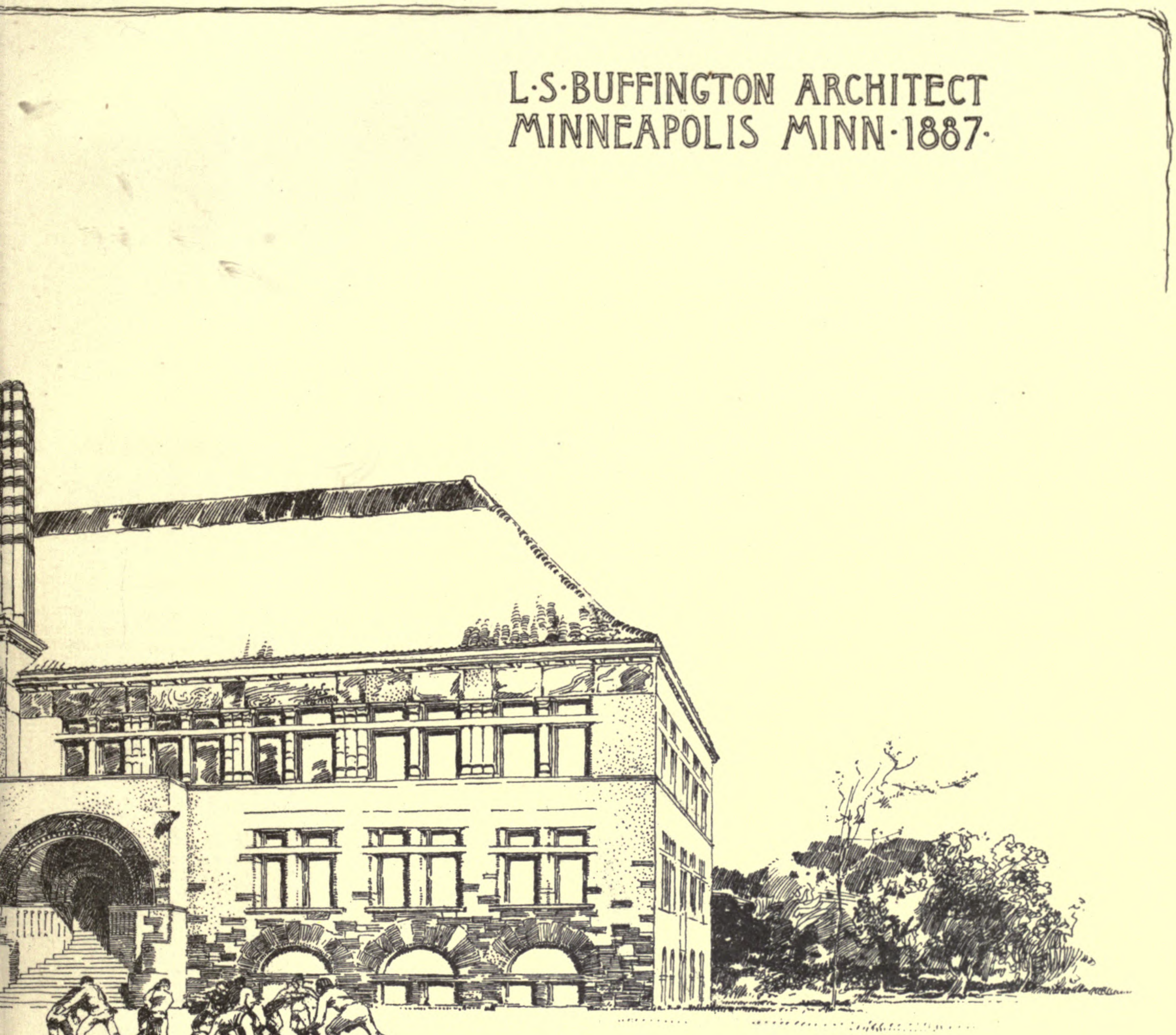
COMPETITIVE DESIGN FOR A CLUB-HOUSE. MR. GEORGE F. HAMMOND, ARCHITECT, CLEVELAND, O.

CALENDAR FOR THE YEAR 1888.

American Architect

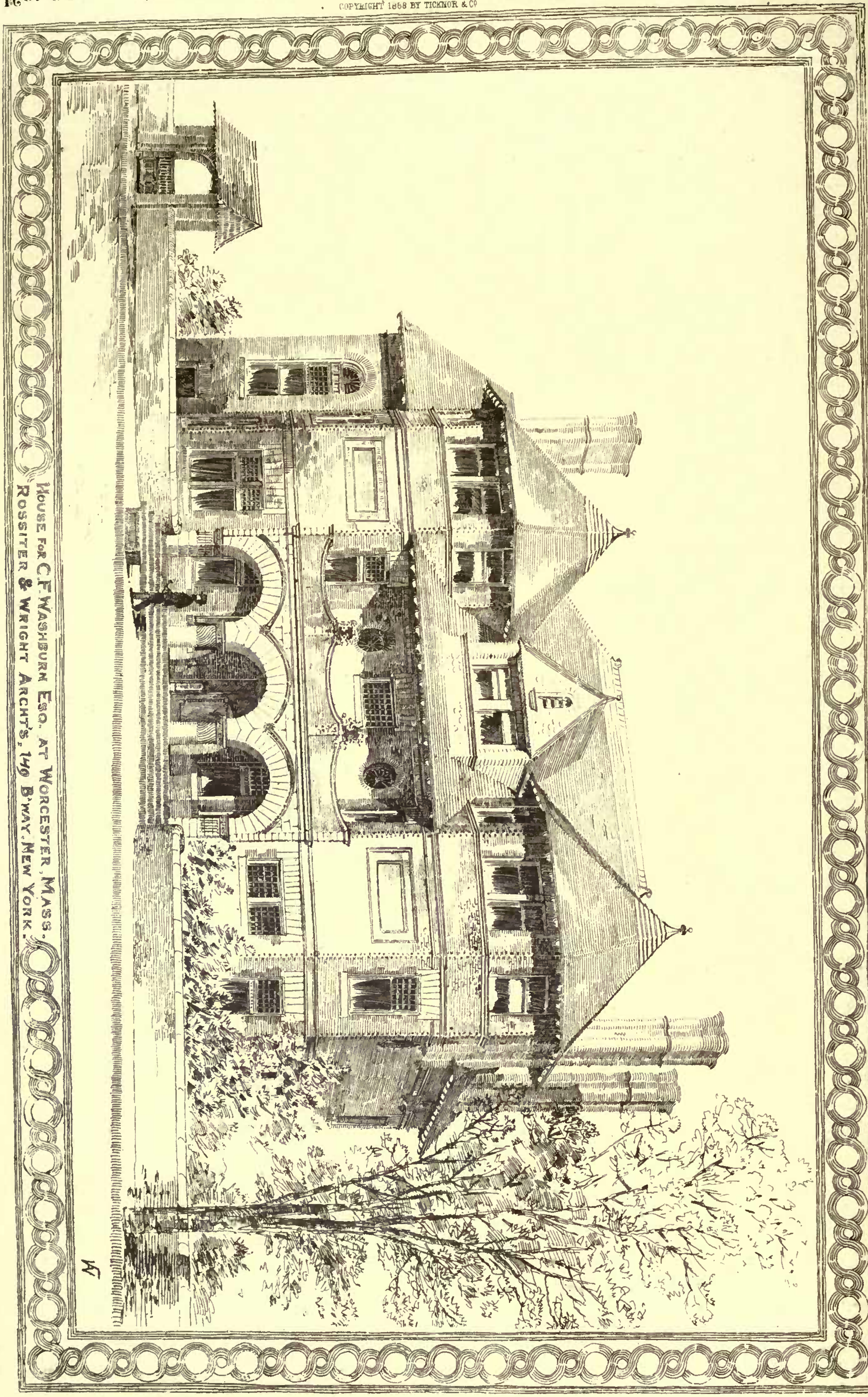
COPYRIGH





Heliotype Printing Co. Boston.

COPYRIGHT 1888 BY TICKNOR & Co

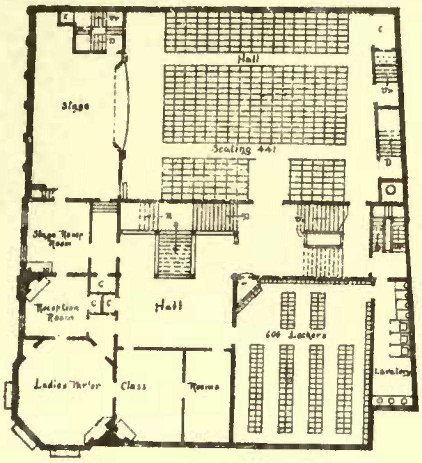


HOUSE FOR C. F. WASHBURN ESQ. AT WORCESTER, MASS.
ROSSITER & WRIGHT ARCHT'S, 149 B'WAY, NEW YORK.

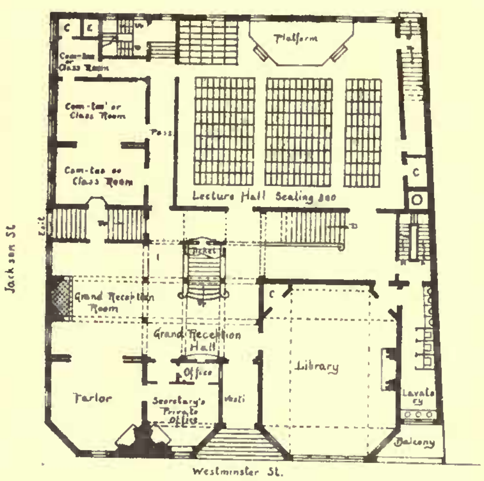
American Architect a

COPYRIGHT 1

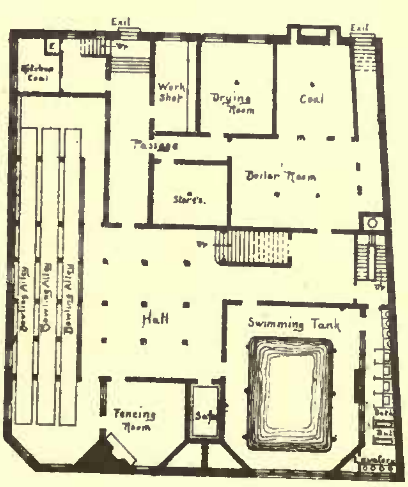
2nd STORY PLAN

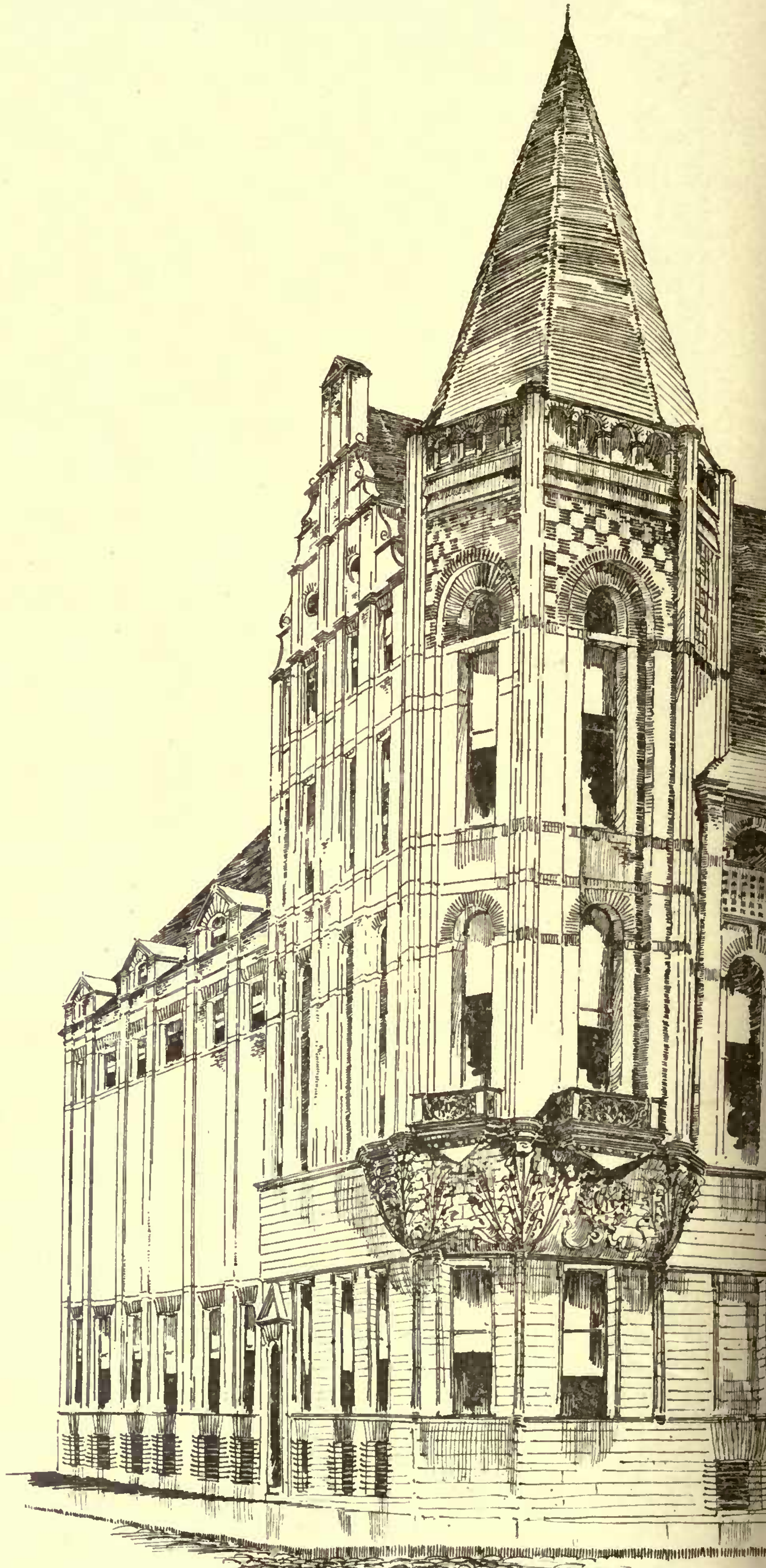


1st STORY PLAN



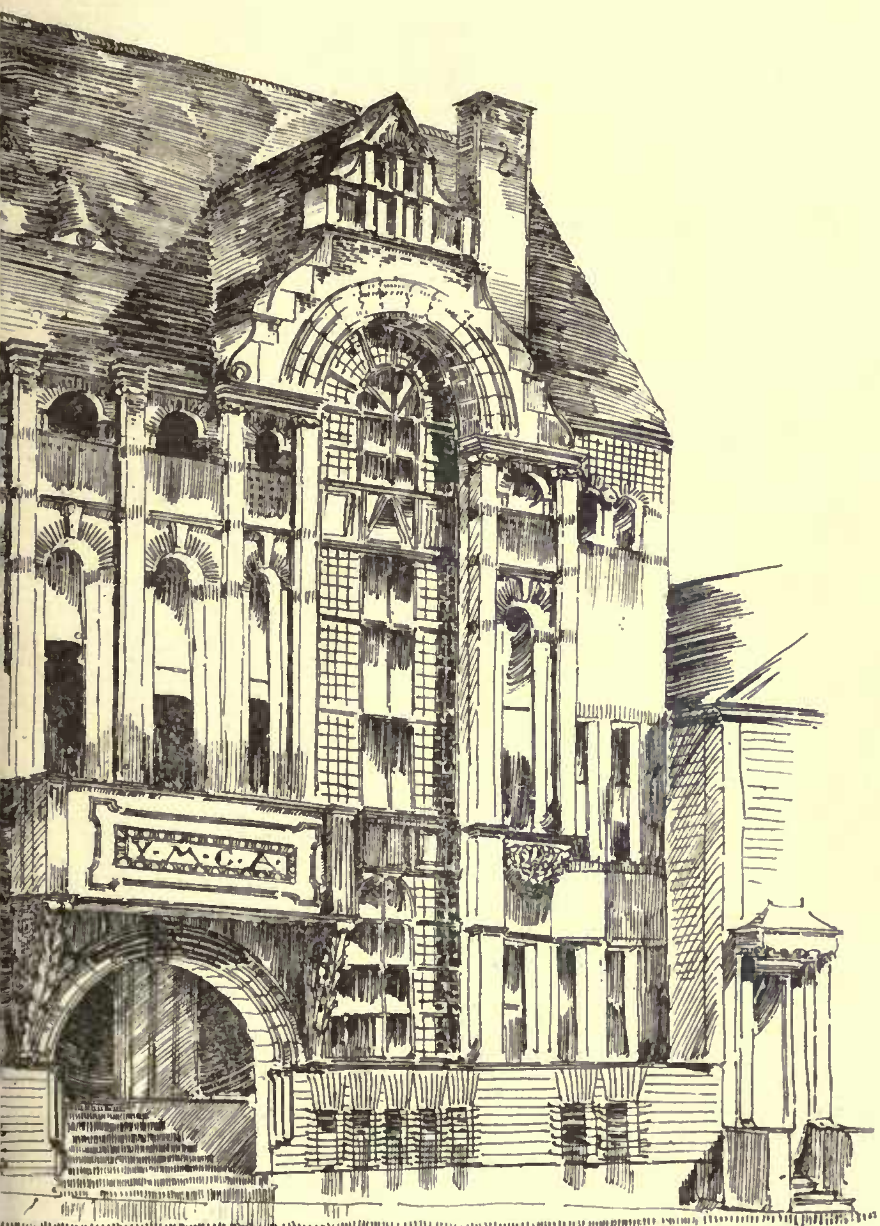
BASEMENT PLAN



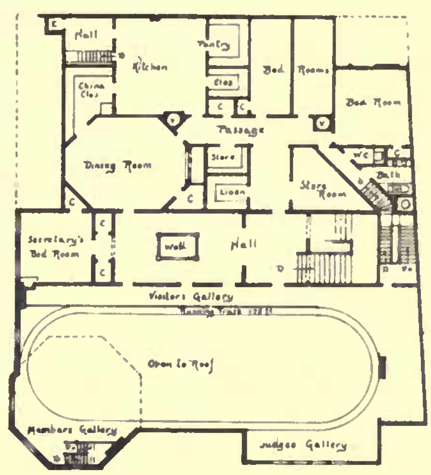


Competitive Plans for Y.M.C.

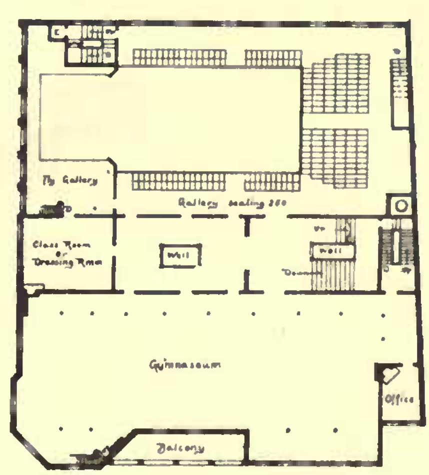
Submitted by Howard Hop



4th STORY PLAN



3rd STORY PLAN



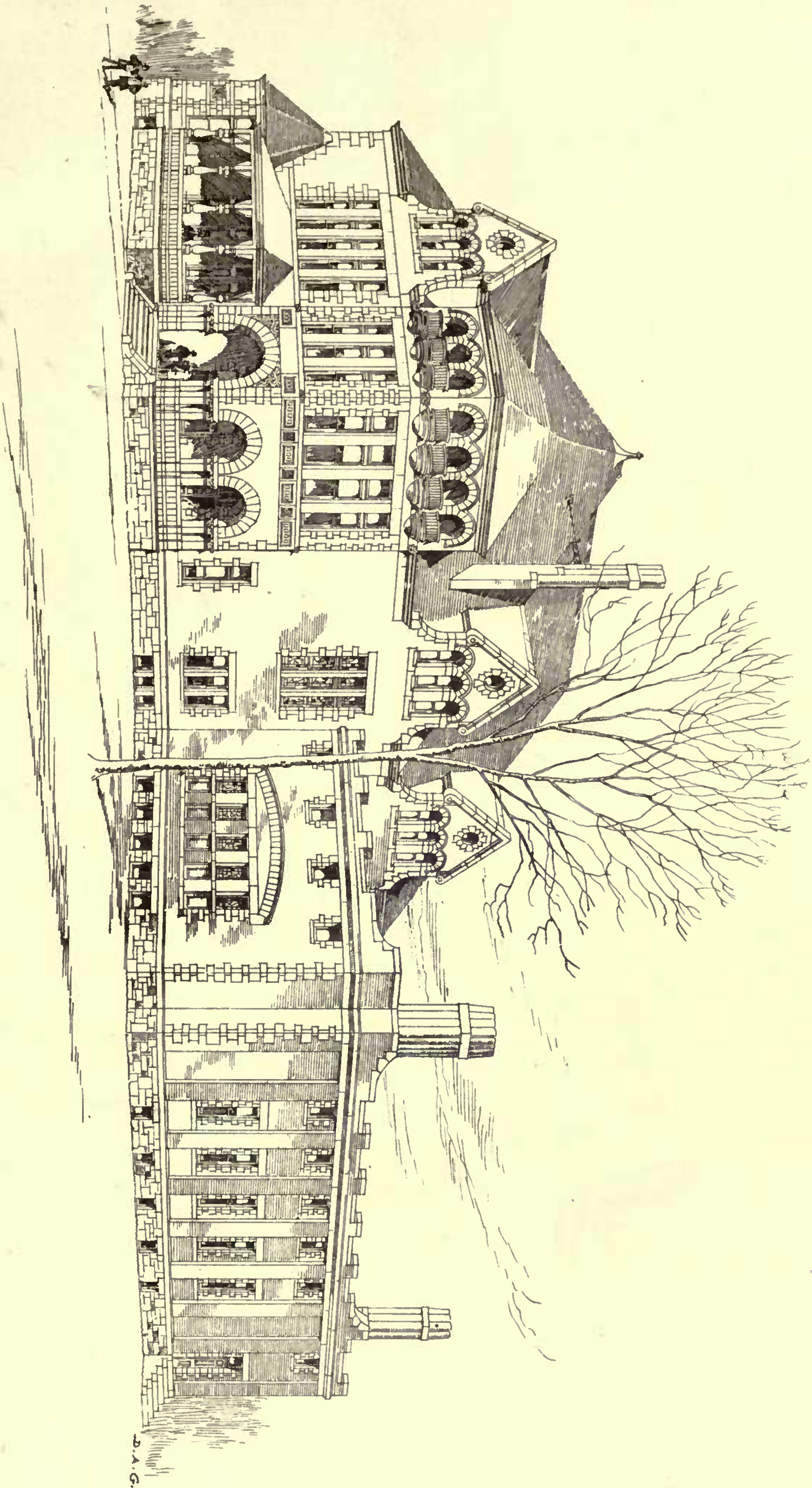
Building Providence, R. I.

Arch't Prov. R. I.

Heliotype Printing Co Boston.

AMERICAN ARCHITECT AND BUILDING NEWS, JAN. 21 1888 No. 630

COPYRIGHT 1888 BY TICKNOR & CO



Competitive Design for a Club House, Geo. T. Hammond, Archt.

CINCINNATI.

THE NEW STREET-PAVING. — RACE STREET AND ITS BUILDINGS.

DURING the past year this city has taken advanced ground and now presents to the traveller many matters of interest that were not to be seen a year or two ago. In the first place, it has now what is essential to give character and tone to every first-class city — well-paved streets. This work was commenced some two years ago, and during that time there have been paved twenty miles of streets with granite blocks and six miles with asphalt, and most of the citizens are considerably provoked because they did not reverse the order of things and have twenty miles of asphalt and six miles of granite, as everywhere the asphalt gives the greatest satisfaction on account of its smoothness, durability and noiselessness. The work of both grades seems to have been well done and reflects credit alike on the engineers who have had charge of and the contractors who performed the work.

It is to the asphalt paving that Race Street owes its wonderful improvements. Two years ago this street — except for the Shillito Building erected by Mr. McLaughlin some five years ago — was considered a by-street with very little business on it; now it is by all odds fast becoming the most important street of a retail character in the city. Buildings of the better class are springing up on every hand, and as it is the only street in the city paved with asphalt from Fourth Street to the Hills, a distance of about two miles, and is, moreover, without street-car tracks its entire length, it is, of course, much sought after as a drive by all vehicles having business in its vicinity.

Among the buildings on this street that command your attention is, first and foremost — on account of its great size if nothing else — the dry goods house of the John Shillito Company, with which our readers are familiar, as it has been described and illustrated in the *American Architect* on a former occasion. Opposite to the Shillito Building, Mr. Hannaford is putting up a neat freestone front for the Frank Estate: the building is about one hundred feet front, is six stories high, capped with a *galvanized-iron* cornice, and has, moreover, the inevitable two-story cast-iron front of which Mr. Hannaford seems so fond of late that he has used it without stint, in season and out of season, until it has grown somewhat into the nature of an architectural "chestnut."

A few doors farther up the street Mr. Rapp is building for Mr. Scarborough a six-story stone-front store about thirty feet wide, somewhat Norman in design, and a decided step in the right direction. The two-story iron-front business must be contagious, as Mr. Rapp has it in his building, and, in looking at this and other buildings of recent erection, one wonders if the new law actually requires that all stores shall have two stories of iron. This feeling is further enhanced by the fact that just below the buildings above mentioned Mr. McLaughlin has a fine building on the corner of Sixth and Race Streets, about one hundred feet square, with the two stories of iron, and one feels as though light could have been obtained from the front side without so much ironwork. The building is of pressed brick and presents a very fine appearance.

The Lincoln Club-house, by Mr. Hannaford, farther up the street (corner of Eighth) is of pressed brick and stone, and is decidedly a good thing.

Just in front of the Club-house, and standing in the middle of the street, is the recently unveiled statue of the late President James A. Garfield. As this is the first public statue erected in this city, and is, moreover, in such a prominent place, it is very unfortunate that so good a statue should stand on so bad a pedestal. Mr. Charles Neihaus executed the statue, but did not design the pedestal, and the result of this effort goes to prove that while the stone-cutter can generally execute a contract, it is not safe, as a rule, to leave him to design anything whatever.

The Phœnix Insurance Company's building, owned by the Emerys and designed and built by Mr. Hannaford some years ago, and one of best-designed buildings in the city, is of pressed brick and stone.

Thus it will be seen that Race Street is fast becoming a fine street, and this is further evidenced by the fact that value of property has nearly doubled in value in a comparatively short space of time.

CARY.

THE WATER-CARTRIDGE. — Reviewing mining inventions during the past year Mr. André, in the *Colliery Guardian*, says that the water-cartridge has undergone important development in the year that is now at an end. In its present state it constitutes a safeguard to the miner worthy of his confidence, and it seems that a combination of the water-shield with explosives would afford in a fiery mine the nearest approach to absolute safety it is reasonable to hope for. The water-shield is largely used in England, but it has made but little headway on the Continent

PARIS CHURCHES.[1] — VII.

NOTRE DAME.

FROM CHURCH AT HAMMERSMITH. ENG.
After "THE BUILDER."

THE origin of Nôtre Dame is enveloped in mystery. Whether the first bishop of Paris, St. Denis, or Dionysius, was the Areopagite spoken of by St. Paul and sent by the fourth bishop of Rome, St. Clement, to preach the Gospel to the Parisians, or whether he was another person of the same name who was sent into Gaul in the third century and martyred during the Decian persecutions, there is no evidence of any value. But it is certain that the first bishop of Paris bore this name and that he suffered martyrdom with his two companions, Rusticus and Eleutherius, on the summit of the hill now called Montmartre.

Under the Roman dominion, Paris was comprised in the fourth Lyonnaise division, of which Sens was the metropolis. Hence, the bishops of Paris acknowledged the archbishops of Sens as their primate until 1622, when at the request of Louis XIII, Pope Gregory XV raised the see into an archbishopric. The succession has consisted of one hundred and nine bishops and fifteen archbishops, eight of whom have been cardinals. Besides St. Denis, there have been six canonized: Marcel in the fifth century, Germain in the sixth century, Céran, Landry and Agilbert in the seventh century, and Hugues in the eighth century. No less saints are the uncanonized martyrs of our own times: Sibour, who was stabbed by a discontented priest in St. Etienne-du-Mont; Affre, who was shot upon a barricade in 1848, and whose last words proved him to be a worthy follower of his Master: "*Puisse mon sang être le dernier versé!*" and Darboy, the liberal-minded, who was shot as a hostage by the fanatics of his own party.

In former times, the entry of the new bishop into his episcopal city was accompanied by much gorgeous ceremonial. All the municipal officers mounted on horses, went to meet him at the Abbey of St. Victor. Thence they processioned, with the prelate seated on a white palfrey, to the abbey church of Ste. Geneviève, from which he was taken chaired by his vassals, to the Rue Neuve-Nôtre-Dame, where he met the dean and canons of the cathedral. After taking the oath to uphold the privileges of the church and to observe the engagements entered into by his predecessors, he was installed and received the homage of the chapter. Mass was then said and at the conclusion he was conducted to his palace, where he gave a sumptuous entertainment.

In 1674, Louis XIV conferred the lands of St. Cloud, Creteil, d'Ozouer-la-Ferrière and d'Armentière upon the archbishopric, a donation valued in the last century at a revenue of 140,000 livres. The chapter of Nôtre Dame was one of the most important in the kingdom. Its revenue amounted to 180,000 livres and its jurisdiction extended to the Hôtel Dieu and the churches which were called *les filles de Nôtre-Dame*. These were St. Merry, the Holy Sepulchre, St. Benoit and St. Etienne-des-Grès. Four other colleges, St. Marcel, St. Honoré and St. Opportune, bore the title of *filles de l'archevêque*. The *enciente* of the cathedral enclosed two churches, St. Aignan and St. Jean-le-Rond, and a garden at the eastern end, which the chapter called *le terrain* and the people, *Motte aux Papelards*.

The cathedral is now open on all sides, and the *coup d'œil* is very fine when seen from the Parvis Nôtre Dame[2] or from the garden, but to obtain this effect, many interesting buildings have been sacrificed — the cloisters, St. Jean-le-Rond, St. Christophe, the episcopal palace, the oldest parts of the Hôtel Dieu, and the Hôpital des Enfants Trouvés, and the chapel built in the fourteenth century by Oudart de Mocreux.

Some remains of altars of the time of Tiberius, dedicated to Jupiter, which were found under the choir, seem to suggest that the Christian church was built upon the site of a Roman temple, or that the latter was converted into a church by the early Christians, as was done at Rome, Ravenna and other places. But the earliest authentic record of a church in Paris is in the life of St. Marcel, where we find that in the fourth century one stood at the eastern extremity of the island. This is supposed to have been rebuilt by Childebert I at the instance of St. Germain, for it is not probable that the building described by Fortunat, bishop of Poitiers, as rich in marble columns, glass windows, and magnificent ornaments, could have been the original edifice. Indeed, a discovery made in 1847

[1] Continued from No. 624, page 278.

[2] From time immemorial, the space to the west of the church was called *Parvis paradisus*, the terrestral paradise which led by the celestial Jerusalem.

seems to prove this. During some excavations in the place du Parvis, it was found that some Roman houses had been destroyed to make room for the foundations of Childebert's church, and, together with the Roman remains, were marble cubes, which formed the pavement, three columns in Aquitaine marble, and a Corinthian capital in white marble. The Christians of the fifth century adhered to the style of building adopted by the Romans for their basilicas; in fact, as is well known, the basilicas were frequently adapted to Christian worship. Hence, it is but probable that Childebert looked to Rome for the design of his church.

From the sixth to the twelfth centuries there is no record of Nôtre Dame, but Gregory of Tours and d'Aymoin, toward the end of the sixth century, speak of two churches close together, but distinct from one another — the one, St. Etienne, to the south of the present church, the other, Ste. Marie, towards the northeast. A rather doubtful tradition attributes certain works of construction in the church to bishop Erchenrad I during the reign of Charlemagne. But it is known that in 829 the celebrated Council of Paris was held in the nave of St. Etienne, and in 857 the other church, Ste. Marie, was burned by the Normans, the bishop, Énée, being able to save only the former church. In the twelfth century, archdeacon Étienne de Garlande, who died in 1142, made some important restorations to Nôtre Dame, and Suger, the great abbot of St. Denis, gave it a stained-glass window of great beauty — probably similar to those in his own church. So, too, the early Capétian monarchs frequently visited this *nova ecclesia* (as it was called to distinguish it from St. Etienne) and presented it with valuable ornaments.

We now come to the building of the present church. Maurice de Sully, the seventy-second bishop (1160–96), had scarcely mounted his episcopal throne, when he determined to rebuild his cathedral by joining the two existing churches, and upon his epitaph in the abbey church of St. Victor he was accredited as the builder of Nôtre Dame. On April 21, 1163, at the instance of Abbot Hugues de Monceaux, Pope Alexander III consecrated the recently-constructed apse of St. Germain des Près, and it is also affirmed that he laid the first stone of the new cathedral in the same year. In 1182, the high altar was consecrated by Henri, the pope's legate, and three years later, Heraclius, patriarch of Jerusalem, who had come to Paris to preach the third crusade, officiated in the choir. Geoffrey, count of Bretagne, son of Henry II of England, who died in 1186, was buried before the altar of the new cathedral, and towards the end of the century, the wife of Philippe-Auguste, Isabelle de Hainault, was laid near the same place. When Maurice de Sully died, the church could not have been completed, as he left 5,000 livres towards the leaden roofing of the choir. Indeed, the western façade was only commenced towards the end of the episcopate of Pierre de Nemours, 1208–19, although the work had been continued during the time of his predecessor, Eude de Sully, 1197-1208. According to l'abbé Lebeuf, the remains of the old church of St. Etienne were demolished towards the end of the year 1218 to make room for the southern part of the façade, and, amongst other finds, were some fragments of the saint's tomb. The west front, as high as the gallery which connects the two towers, was probably finished about the year 1223, when, to make them harmonize with this rich façade, it was determined to rebuild the portals of the transepts. An inscription at the base of the southern porch attests that on the second day of the Ides of February, 1257, Master Jean de Chelles commenced this work in honor of the mother of Christ, St. Louis being then king of France and Renaud de Corbeil bishop of Paris. And, in spite of certain documents amongst the archives, there is no doubt that the little *porte rouge* and the first chapels on both sides of the choir belong to the same period and were the work of the same architect, for they are quite similar in style and are built of the same stone.

The original design of the church did not comprise the chapels on the flanks of the nave, which somewhat spoil the effect of the exterior, and, in this respect, the cathedral of Paris cannot be compared to those of Reims and Chartres, which have no chapels between the buttresses. They were added to Nôtre Dame in 1270, Jean de Paris, archdeacon of Soissons, having bequeathed 100 livres for their construction. The chapels of the *chêvet* were finished at the end of the thirteenth or beginning of the fourteenth century. An inscription at the entrance of one of them, St. Nicaise, placed upon the pedestal of a statue of Simon Matiffas de Buci, recorded that this chapel and the two next were founded by the bishop in 1296 and that the others were added subsequently. This precious relic was discovered at St. Denis amongst a number of others from different churches. One of these gives the name of Canon Pierre de Fayel as the donor of 200 livres towards the *histoires* which surround the choir and some new glass, and another gives the name of the sculptor of these same *histoires*, the Masters Jean Ravy and Jean le Bouteiller, who carved them in 1351. It must be remembered that the great churches of the Middle Ages were more the work of the people than of the nobility, and thus we find that the armorial bearings upon old glass or upon the pedestals of statues are mostly those of the different trades-guilds—the bakers, the butchers, the woollen-drapers, the furriers, and the like. These, either as individuals or as a corporate body, enriched the old churches in money or in kind.

All the six doors of Nôtre Dame bear distinctive names — the *portes du Jugement, de la Vierge* and *Ste. Anne* at the west end; the *portes du cloître, St. Marcel* and *Rouge* at the east end. These are all a mass of exquisite sculpture, but, unfortunately, a great deal is modern work. The central portal of the west front in particular was wrecked by Soufflot in 1771 in order to increase its width for processions; it is one of the many examples to prove the fact that the stupidity of man has done more harm to old buildings than time or even disastrous riots or revolutions. In 1773 and 1787, so-called restorations, by architects who ought to have known better, still further mutilated the church. Nothing gives a visitor to Nôtre Dame a better notion of the richness of its sculptures than mounting to the gallery of the Blessed Virgin, whence he obtains a full view of the roof and the galleries, with their numerous pinnacles, crockets, images, finials and gargoyles.

The interior is imposing, though somewhat heavy in character; and although the nave and choir were sixty years in construction, there is scarcely any difference in style, except in the details. There is a certain clumsiness about the great round shafts of the nave, but the carving upon the angles of the plinths, and of the capitals help to relieve this effect. Most of the capitals are ornamented with examples of the flora of Parisian fields. At the west end is a gallery now occupied by the great organ, but which formerly was the stage where miracle-plays were performed. The choir is by far the most beautiful part of the church; and being filled with stained-glass, it has not that painfully cleaned-up appearance which is the result of over-restoration. Some parts of it, the bays which separate the side-aisles from the crossings, are of the fourteenth century; and the little angels blowing trumpets which surmount the archivolt, are beautiful specimens of sculpture of that period. The capitals of some of the choir columns being the oldest in the church (the early part of the twelfth century) are very rich in the quaint style of decoration delighted in by Mediæval artists — masses of foliage, with heads of grotesque animals peeping out, and biting off the leaves and flowers. One capital (between the seventh and eighth southern chapels) is interesting, as showing the transition between the use of personages and animals, and that of foliage only, which was customary in the later period. The subject is very unecclesiastical, as was so often the case in the twelfth and thirteenth centuries — two Harpies, male and female, with human heads and bird bodies, issuing out of the foliage. Much of this is treated in the most realistic manner, and we find specimens of the oak, the ivy and the trefoil.

In many of the chapels are double piscinæ; from one, the water in which the priest washes his hands *before* mass, is ejected by a pipe; from the other, used *after* mass, the water descends into the ground. They are ornamented with carved canopies.

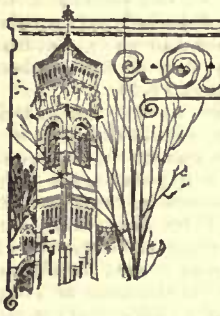
The Lady chapel, or chapel of the Compassion, and the two on either side, are painted and gilded, a good deal of the old coloring having survived as a guide. There is some good carving, and in front of the tabernacle hang seven lamps of elegant design. These, added to the beauty of the stained-glass, make this end of the church far the most beautiful part.

The alto-reliefs, alluded to above, by Jean Ravy and Jean le Bouteiller, are against the wall behind the stalls of the choir. Formerly they were continued across the *jubé* and all round the choir; but, unfortunately, when the choir gates were constructed, these sculptures were sacrificed. The subjects are: 1, the Visitation; 2, the Appearance of the Star to the Shepherds; 3, the Nativity; 4, the Adoration of the Magi; 5, the Massacre of the Innocents; 6, the Flight into Egypt; 7, the Presentation in the Temple; 8, Christ disputing with the Doctors; 9, the Baptism of Christ; 10, the Marriage in Cana; 11, the Entry into Jerusalem; 12, the Last Supper; 13, Christ Washing St. Peter's Feet; 14, the Mount of Olives. On the *jubé* were the mysteries of the Passion and the Resurrection. It is to the Cardinal de Noailles, that we owe its destruction. On the south side, the subjects are of later date (fourteenth century): 1, Christ appearing to the Magdalen; 2, to the Three Maries; 3, the Apostles running to the Sepulchre; 4, the Journey to Emmaus; 5, Christ appearing to the Disciples; 6, to St. Thomas; 7, to St. Peter on the Sea of Tiberias; 8, Another Appearance to the Disciples; 9, the Charge to preach the Gospel in all Lands. Jean Ravy was represented kneeling with joined hands in the last of these alto-reliefs. The whole was finished by Jean le Bouteiller in 1351; and it is recorded that a part was a votive offering in honor of God, of the Virgin Mary, and of *Monseigneur* St. Etienne, given by Guillaume de Melun, Archbishop of Sens — one of two bishops of the name who occupied the see in 1317–29 and 1344–96 respectively. The sculptures are all colored and gilt. A very good cast of them all may be seen at the Crystal Palace near London.

The choir remained intact until 1638, when Louis XIII, putting his kingdom especially under the protection of the Blessed Virgin, registered that unfortunate vow, that he would consecrate the sanctuary of Nôtre Dame to the fulfilment of it. "*Afin, que la postérité ne puisse manquer à suivre nos volontés à ce sujet, pour monument et marque incontestable de la consécration présente que nous faisons, nous ferons construire de nouveau le grand autel de l'église cathédrale de Paris, avec une image de la Vierge qui tienne entre ses bras celle de son précieux fils descendu de la croix, et où nous serons représentés aux pieds du fils, et de la mère, comme leur offrant notre couronne et notre sceptre.*" Louis XIII died in 1643, before he was able to accomplish his marvelous design; but, unfortunately, his son, Louis XIV, was only too ready to embellish buildings in the bad taste of his times, and so the altar is disfigured by a descent from the Cross by Nicholas and Guillaume Couston, and a pair of kneeling kings on each side by Coyzevox. The altar itself with its bronze angels was given by Napoleon in 1803, to replace those destroyed during the revolution. The statue of the Virgin on a pillar at the entrance of

the choir, had the reputation of working miracles. It was thrown down at the revolution, but was found later at St. Denis and replaced in Nôtre Dame. Such is its history, but whether it is the identical one, it is impossible to say. In any case it is mainly of the same date as the church, which cannot be said of the reliquaries in the treasury which are also supposed to have survived the revolution. That many sculptures were saved by a deputy named Chaumette, and by Alexandre Lenoir, as works of art worthy of preservation, is a well-known fact; but, unfortunately, reliquaries were of more value as metal, and most of them passed through the melting-pot into coinage for the bankrupt national treasury — the reliquaries shown at the cathedral are mere modern imitations of those they profess to be, and which were formerly in the Ste. Chapelle. Of the glass which dated back to the twelfth century, little remains but fragments in the apse, and the three great rose-windows. These repeat the imagery of the three great doors, which proves them to be contemporary with the stonework which surrounds them, and are most magnificent specimens of Mediæval glass. The bells have been no less unfortunate, for out of the original thirteen, only one, the *bourdon* (and largest) remains. It weighs over thirteen tons, and was founded by N. Chapelle, J. Gillot, C. Moreau and Florentin le Guay in 1400, when it was presented to the church by Jean de Montaigu, and named after his wife, Jacqueline de la Grange. In 1686 it was re-founded and received fresh names, those of Emmanuel-Louise-Thérèse d'Autriche. In like manner, the tombs were mostly destroyed, and those saved by the exertions of citizens Chaumette and Lenoir, have, since the dispersion of the objects placed in the Museum of the Petits-Augustins, found a home elsewhere. Indeed, there is nothing in Nôtre Dame which strikes one as venerable but the glass, so unmercifully has every portion been scraped and cleansed. That it wanted it after the pollution it received by the 1793 fanatics, there can be no doubt; but at the same time one cannot but regret that it was necessary. All Viollet-le-Duc undertook was well done, and he was, no doubt, the first amongst the restorers of Gothic buildings of this century. Nevertheless, it may be a matter of opinion, a debatable point, whether so much restoration was necessary. There is nothing poverty-stricken in the work at Nôtre Dame or at the Ste. Chapelle, or at St. Denis, such as we find at St. Albans; Viollet-le-Duc would never have dreamed of making an entire new front to a church, evolved out of his poor nineteenth-century inner-consciousness; such an act would have appeared to his artistic mind the height of Vandalism. But there is a difference between repairing and restoring, and we may wish that our old churches were treated to less of the latter system. By all means repair the ravages of age where absolutely necessary; but let the work of each succeeding age that has come down to us remain. There is something monstrous and appalling in the conceit of a man, who pulls down Perpendicular work, and rebuilds in the "original" Early English or Norman, because, forsooth the two styles do not harmonise.

S. BEALE.



BOSTON

ATTENTION RECENTLY GIVEN TO PROPORTION IN DESIGN. — THE NEW COURT-HOUSE. — THE ADDITION TO THE ART MUSEUM. — DONAGHUE'S STATUES.

WHAT a pity it is that sound and sense are not always in harmony, that each design from the hand of an architect cannot have applied to it some word or phrase which would express its character conclusively and at sight. What sort of word would it be that could carry with it a realizing sense of the incongruities, the vagaries, the thoughtlessness of most of our present architecture — a word that would condemn and stigmatize justly and not with mere ridicule?

It is this necessary lack of acknowledged definition that allows indiscriminate criticism and eulogy alike. Where there is no standard, words lose their value. Yet it seems that it should not be so hard a matter to find some general terms or reasons for worth or worthlessness which should be applicable to all design. It is plain that a building is an organism more or less complicated and can be, in a general way, compared with other organisms, and is subject to similar adjectives. The life of a building is dual; it must satisfactorily fulfil its purpose of utility and its duty of character. The question of utility is never an open one; the question of character changes with each subject and with every mind that approaches the subject. There are surely buildings equally useful, of good and of bad character, and there are still others which are monstrous. Physical and moral monstrosity is repulsive. Monstrosity in architecture should be equally so, but the natural impulse of recoil is doubted because it cannot be fully defined. But the same reasons for repulsion are in both, that is lack of relative proportions and uncertainty of outlines and of purpose — the very qualities that make or mar a building and of which we hear nothing, while, on the other hand, every piece of alleged architecture is labelled as belonging to some classified style and criticism is disarmed. Styles are at most but the costumes of architecture, and a scrupulous adherence to them smacks somewhat of archæology.

This desultory meandering of thought was suggested by the sight of several buildings either recently completed or in process of erection that seemed to give promise of a better understanding of things. These buildings are as follows: the Algonquin Club-house, the Cochran house, two light-colored stone houses on Beacon Street, R. H. Stearns's new store on Temple Place, and a small building near the entrance to the Providence R. R. depot. The qualities of these buildings will only be mentioned in the most general way in this letter, as the details and materials of each will be taken up later. They all have this in common, that they are simple throughout and especially so in sky-lines. This alone is refreshing. After the usual tortured silhouettes that cut against the western sky in the Back Bay district, it is a pleasure to see a straight line of any length. They depend upon proportions and not upon projections, and especial study has been given to the relative proportion of openings to wall-surfaces. None of these buildings have descended to the barbarism of using rock-face stone, that announcement of cheap material and curtailed labor that is so prevalent. The quietness of the simple skylines, the dignity of the cornices (so few buildings lately have ever shown that a cornice meant more than a necessary gutter), the sense of stability and inertia in the unbroken, horizontal courses, are all qualities of much greater value than the would-be picturesque round arches, the rock-face facets, and the restless carving of the usual work. It matters not whether these buildings are Classic or something else, except for the matter of detail. All architecture partakes of a classical character when it is studied carefully and refined, for it is to study and refinement that Classic architecture owes most of its value. The use of precedent always raises the cry of "affectation," but it is apparent that we wear shoes similar to those of our ancestors except that we have discarded the buckles, and affectation in clothes usually means the conspicuous parade of a new conceit rather than the suggestion of an old habit. Perhaps it may be the same in architecture.

There are two important works going on in Boston that ought to receive an expression of general opinion to create much more interest than they seem to do. They are the Boston Court-house and the addition to the Art Museum. The Court-house has been carried on with activity, and is now on the Pemberton Square façade at the height of one story. It at once invites criticism. The Commissioners in selecting the plan now being carried out, showed most excellent judgment so far as the plan was concerned. As published in their report it is a masterly plan — of great possibilities. The elevations showed less study, and created a hope that they would undergo material changes and be simplified. Of the details it was impossible at that time to judge. The long series of windows on Pemberton Square, the flanking pavilions and the entrances if they could only be deprived of a few unnecessary ornaments which it would be better and cheaper to omit, had in them an excellent scheme of composition. The precedent, the Brussels Town-hall, was most unfortunate as it is a very mongrel and bad piece of design, but this precedent had been markedly improved upon. With such a start, there was great hope in the result. It does not seem that this hope is being sustained. It seems to be a popular, and at the same time a very erroneous impression, that if the plan of a building is good, and if sufficient money is appropriated, the result must be of value in proportion to the sum expended, no matter in how unskilled a manner the artistic work is developed. In all professions except architecture, a critical case requires an expert, and perhaps a consultation. In this case, the public are in the same position as the lawyer's client or the doctor's patient. The case is critical. Here is a building to stand not for this generation, but for many successive generations. It will not be compared with past work, but with future work, and the standard of excellence has risen sufficiently in the last ten years to justify the expectation that this progress is only the faint beginning of a much more general appreciation of excellent things, and of fine art and architecture. Every good building erected is an epoch. It is a thing to point to as a standard for achievement. We have few enough of such standards. Every building that fails to meet the higher requirements, the better taste of the progressing time, is an obstacle, and will be felt every successive year to be a thing that cumbers the earth, and at last to be a shame and a disgrace. It is, therefore, no longer a question of policy or of preference. The Commissioners and architect have devised an excellent plan, but they have not obtained the requisite skill to carry out the façades as they should be in the matter of proportion and detail. This is no easy matter. It requires not only a training that is essentially academic, but a sense of refinement and a personal quality of work which is most exceptional. But it is obtainable, and it is manifestly the duty of the public to request the Commissioners to obtain it. The architect has so carefully studied and carried out his plan, that it is not justice to himself for him to allow the development of the exterior to be any less able. If he is to be known in the future, it will be by the artistic merit of the building, and not by its suitability to the requirements of the latter end of the nineteenth century, greatly as that may be desirable at the present time. It in no way depreciates from his dignity or ability as an architect if he covets the assistance of men with different talents. No man can carry such a work single-handed, but it most seriously behooves all concerned to see that the present commonplace detail and unstudied

proportions of the first story of the Court-house are not repeated as the building ascends.

We understand that Mr. Cabot has been appointed advisory architect on the Court-house, which is a very decided step in the right direction. Only it is to be hoped that his advice will be followed implicitly, and not hampered by preconceived ideas.

In regard to the Museum of Fine Arts: the present building is to be enlarged by the addition of a wing upon Dartmouth Street, by another corresponding wing at the other end, and by a building connecting the extremities of these wings and parallel with the present Museum. These additions will materially increase the available floor-space of the Museum, but even when completed, there will be lack of room for the proper disposition of the material the Museum has at its command, and still further additions will be necessary. It is partly for this reason and partly from the artistic standpoint that the following remarks are made. The decoration of the present building is in terra-cotta and the principal motive of the architecture is an arcade in Victorian Gothic, with twisted and belted columns, decorated voussoirs, ball-flowers, crockets, label-mouldings, canopies, weathered buttresses, pinnacles and finials. These various and varied motives, which require the nomenclature of Parker's Glossary, are expensive and have been a constant source of annoyance.

It is said that terra-cotta is not to be used in the new wings, and it is a subject for congratulation that this "*on dit*" is authentic. The great fault with the Art Museum (apart from the garishness of its color, which will become subdued in time) has been its lack of dignity and scale caused by an overproportion of ornament. The opportunity has now arrived to, at least in part, remedy this fault. The new façades can be made simple, frank pieces of architecture, relying upon their relative proportions alone for their worth. There is no objection to using the present façade as a rich mask for a simpler mass of building behind.

There are many precedents for this treatment — Pavia, for example, and the west fronts of many of the Lombard churches, as compared with the courts and walls behind them. The great Ospedale at Milan, which possibly gave a suggestion for the use of terra-cotta in the Museum, is much more dignified and noble and has much more plain wall-space in proportion to its openings and ornamentation. There is only one case that occurs to us of a façade where the terra-cotta has anywhere nearly the same proportion to the brickwork that it has on the Museum. It is a small house in Mantua and it is by no means the best of the houses of its class.

The exterior, also, should in some way endeavor to express the interior, and, with the varied uses to which the rooms will be put, it is difficult to do this with so inflexible a motive as this Gothic arcade and buttresses. And while we are being disagreeable, a word might be said about the detail. Some twelve or thirteen years ago "*Colling's Art Foliage*" was a standard work. It was even in greater demand than "*Talbert's Furniture*," and was equally bad. Its chief characteristics were a staccato system of light and shade and a love for disagreeable angles and for granulated beasts. It was during the heyday of this work and under the direct influence of its author that the Museum was built. Time has adjudged the book valueless. Whatever treatment the new façades of the Museum may receive, let us hope that the disintegrated design derived from "*Colling's Art Foliage*," will not form a part of it.

There are now at Horticultural Hall three statues by Mr. Donaghue which deserve at least a passing glance, if not more than that. Sculpture should stand in very close relation to architecture, and it is not especially to our credit that it has not done so. What few attempts we have made to associate sculpture with architecture, though far from being discouraging, have not been so signally successful as to encourage a following. The difficulty has been twofold — lack of sense of proportions in the architect — lack of concentration of idea in the sculptor. The examples of sculpture that are everywhere about us, not alone groups, but isolated figures, are each and all doing too many things at once, the action is diffused, the energy is dispersed. In all the best sculpture of the Greeks, the motive, the action, or the repose of the statue is single and unmistakable, and not dissipated in a number of little side-thrusts that only serve as distractions. Each statue is a unit or group. Perhaps with us it is the natural result of the complex nature of our surroundings that wrongs our work so. Be that as it may, Mr. Donaghue has so far concentrated his idea in each of these statues that it is unmistakable. They have the same merit relatively with other modern American work that the characters of great novelists which become personalities to us, have to the numberless story-ghosts of the petty novelettes. Whether the idea is one worth being concentrated is another matter. Taking these statues in what seems to us the order of their merit, *i. e.*, "Sophokles" — the "Boxer" — the "Hunting Nymph" — apart from the simplicity of action in each — there are many things worth study. The Sophokles is, properly enough, studied from the Greek. The head strongly resembles the Hermes head. But the influence of M. Falguière is felt as a sort of galvanic shiver, that stirs and spasmodically animates the limbs. There is an inward twist to the left heel, a tense line in the left leg, which though it may add vivacity to the general action, makes it lose in dignity. The strong inclination of the figure to the right, tends to heighten this accentuation of the real over the ideal. To what extent this can be carried without losing more than is gained, is purely a matter of individual opinion; for our own part, we prefer to think of the youth Sophokles with the dignity of victory in his step, not with the elation of conquest.

In the "Boxer" the torso and legs are certainly well done. The man stands easily and well. The head and arms express brutality, swagger and insolent confidence. If that is what the sculptor wished, he has certainly attained it — but whether it is worth the doing is an open question.

In the "Hunting Nymph" a very original and daring conception has been well carried out. She is leaping down the mountain-side, with her weight thrown back upon the right leg, the left thrown forward and downward, and in mid-air — her eyes following the arrow which has just left her bow, the right hand raised, falling after having released the bow's ring. Her drapery is flying backward with the rush of air past her from the speed of her descent, the whirling lines serve to check the apparent fall of her body downward.

It is all done so well, there is so much spirit in it, the drapery, though perhaps a little heavy, is so carefully studied that it seems a thankless task to be a carping critic — and yet, it is doubtful if any statue which represents suspended continuous action is ever lasting in the pleasure it gives. It is a good motive for a statuette, for something on such a small scale that the lack of quantity has to be balanced by a more sensational quality — not for a statue. We would like to say more about this difference between a statuette and a statue, but will have to postpone any subject with such vistas in it for the present — but we have what we think are fairly good reasons for believing that the extent to which a statue should go in action is to represent the intervals of rest between a series of actions, not the suspension of an action itself. The technique of these statues, the evident facility in modelling and getting the results desired, is most refreshing after the platitudes of statuary that are to be seen all over the city. Certainly here is an able, trained man, who, if he will only omit the little tang that is so often felt in a Frenchman's work, like the burr in a dry-point etching, and will give us the clean, skilful strokes without the burr, should be most heartily bade Godspeed.

BOOKS AND PAPERS.

A HANDY little volume recently issued deals with retaining walls for earth.[1] It is one of those works which are almost a necessity in an engineer's library, and are often quite valuable to an architect; and the volume in question is so complete and exhaustive in its nature that architects would find it useful in many ways. The book claims to be an attempt to present the subject in a simple manner, and to show by a few examples the simplicity of the application of the formulas to actual constructions. The author wisely states in his preface that the reader who does not care to follow the theory until he is persuaded of its practical value in application can skip the formulas and turn to the problems in the second portion of the volume, which deal entirely with applications of the deduced formulas. It is a treatise which partakes more of the nature of an extract from the transactions of some engineering society than of the text-book order, but it is none the less valuable in its special field.

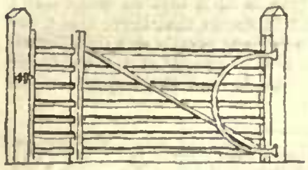
Mr. Howe is very rigid in his formulas, but he does not entirely neglect the practical teachings of experience, and he cites part of a discussion upon the old question whether a competent engineer could not guess at the section necessary for a retaining-wall much easier than he could calculate it. While his arguments in favor of using the formulas are not the most conclusive, still he shows that there certainly is no harm in making sure of one's rough calculations. He makes a very sensible statement in one place in regard to tables of retaining-walls such as are given by works of the character of Trautwine, saying that they are of little practical value, excepting, perhaps, in as far as they relate to rectangular walls and a level earth-surface, and adds that the numerous tables giving the calculated required thickness of retaining-walls to three places of decimals, stand on the same scientific basis and have the same practical value as the weather records for the year in old Moore's almanac.

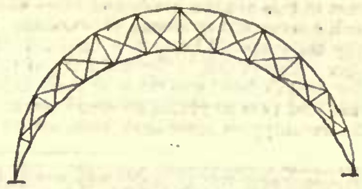
ANOTHER work of a very different character deals with the subject of fences and gates,[2] claiming to be a practical manual of the subjects. It is a capital book for a farmer or any one who has to look after an estate. It is not at all scientific or artistic, however. The gates and bridges illustrated are purely practical and homely enough to suit any one, but the work tells all there is to be told on the subject, and commends itself to the man of hard, practical ideas, who is going to make a thing right first, and make it pretty afterwards. One would hardly imagine that a volume could be evolved from such themes. The author states in his preface that the building and maintenance of farm-fences in the United States have cost more than the valuation of all farm-buildings, a fact which seems a sufficient *raison d'être* for so comprehensive a book. The author has aimed at a work which will show the evolution of the fence from a road-barrier of logs, brush or sods to the latest improved

[1] "*Retaining-Walls for Earth.*" The theory as developed by Professor Jacob J. Weyrauch; by Malverd A. Howe, C. E. New York: John Wiley & Son.

[2] "*Fences, Gates and Bridges.*" A practical manual. Edited by George A. Martin. New York: O. Judd & Co.

forms of barbed wire. The illustrations to the number of 294 are mainly representations of fences, gates and bridges in actual use. It does not go into the subject of bridges any farther than would be called for in and about a large farm, giving only the ordinary forms, and a few bridges which pretend to be artistically rustic, but which are irretrievably ugly. A number of clever devices are illustrated





in the way of gates, one of which seems to us so sensible that we have reproduced it herewith. The author described it as a cheap, light, durable gate which, in over twenty years' use has never sagged, though standing in a thoroughfare between three farms, and also in the years past used for access to a saw-mill — a gate, which, it is claimed, could not possibly sag.

A work which has lain on our shelves for some time is the treatise on "*Graphical Statics*," by Professor Ricker.[1] The matter embodied in this book represents essentially the course of study in graphical statics pursued by the students of the School of Architecture in the University of Illinois, and is the result of a good deal of study and condensation from all available sources, and re-arrangement by Professor Ricker in the form in which it now stands. To those who are acquainted with the author, it will go without saying that the work is thorough and exhaustive; a book to be studied consecutively and not dabbled into; one that gives everything on the subject that is worth studying. It is not as compact and concise as Greene's work on the subject, but it is more thorough, and as a reference-book is much more available. Professor Ricker's work is written for beginners, while at the same time it is fully abreast with the most recent investigation. Having to deal with immature minds, the author has been led to use a simplicity of arrangement and a consecutiveness of subject-matter, which makes it very easily followed. There are good definitions of some of the terms. For instance, he defines the moment of a force as the measure of its tendency or power to rotate its plane about the centre of rotation. Another definition is of the Moment of Inertia which he describes as a numerical quantity, whose value depends on both the form and the area of the figure, and which is always represented in formulas by the symbol I. This definition is less happy. We doubt if any one has a very clear idea of what the moment of inertia really means. We confess to being completely befuddled, ourselves, though we know how the quantity is used in formulas and appreciate its importance, but an exact comprehension of the factor is a task from which most architects are quite ready to shrink. Professor Ricker gives in his work some very good tables, both graphical and numerical, and the book is greatly increased in value by an admirable general index. The author has supplemented the purely theoretical side of the question by discussions of large trusses and details of joints, showing by diagrams how the members are put together and how joints are formed, always a dark subject for the beginner. For a single problem which will illustrate the practical nature of the book, the one on page 77 is about as good as could be selected; a problem calling for a semicircular truss of eighty feet clear span, with a depth of ten feet at the top, and divided into twelve panels by radials; trusses sixteen feet between centres; radials to be in tension and to be of iron rods, if possible; diagonals to be in compression and to be wooden timbers in any case; upper and lower chords of truss to be built up of plank, bent to the curve and firmly fastened together. We venture to say that when the student has conquered such a problem as this, he will have nothing to fear from any truss to be encountered in ordinary architectural practice.

Professor Ricker has worked out some formulas for the lengths of members of various trusses which he claims are original. They are somewhat clumsy on account of the complication of terms involved, but for bridge-work would be very useful. Taken all together, the work is calculated to give one a very clear idea of graphical statics, and to make one who will study it carefully, thoroughly at home with the subject.

A Remarkable Engineering Feat has just been carried out in China in the face of unusual physical obstacles. This was the stretching of a steel cable of seven strands across the Luan river by Mr. A. de Linde, a Danish civil engineer, aided only by unskilled Chinese labor. The cable is strung from two points 4,648 feet apart. The height of one support is 447 feet above the present level of the river, and the second support 737 feet above it. The vortex over the water is 78 feet. The Chinese cable is the longest but one in the world. The telegraph air-cable across the Kistna has a span of 5,070 feet; two similar cables across the Ganges, one 2,900, and the other 2,830 feet. A third line of 1,135 feet crosses the Hooghly, and in the United States there is one over the Missouri of 2,000. — *Invention.*

[1] "*Elementary Graphic Statics and the Construction of Trussed Roofs.*" A manual of theory and practice; by N. Clifford Ricker, M. Arch., etc. New York: William T. Comstock.

SOCIETIES

THE ARCHITECTURAL LEAGUE.

The annual meeting took place January 9, when the following officers were elected:

John Beverly Robinson, President; Frederic Crowninshield, Vice-President: For Members of Executive Committee, J. D. Hunter, H. O. Avery, C. I. Berg.

The Secretary read a report showing ninety-eight active members and thirty-one non-resident, and much other statistical information as to papers read, etc.

The retiring President Mr. J. Du Fais, made a report showing what had been accomplished during the year.

The Treasurer's report showed the League in good financial condition notwithstanding a deficit in the exhibition accounts of over $600. There was a profit on the catalogue of over $600.

Attendance at meetings sixty-eight. Mr. Robinson's speech upon his election was one of the best short speeches ever listened to by the members.

The following were the awards in the "Memorial Bell and Clock Tower" Competition for the gold and silver medals of the Architectural League: the gold medal, James A. MacLeod, Minneapolis, Minn.; the silver medal, William B. Mundie, Chicago, Ill.; honorable mention, Julius Harder, New York, N. Y.; William C. Noland, Philadelphia, Pa.; Timothy F. Walsh, Cambridge, Mass.

Forty-four sets of designs were received and forty-three considered, one — signed with a monogram composed of two E's — being thrown out for non-compliance with the conditions.

Richard M. Hunt,
Charles F. McKim,
Russell Sturges,
John Du Fais,
Charles I. Berg,
William C. Hazlett, *Chairman.*

Please note that the authors of one design and one with cipher — *three circles interlacing* forming trefoil, are not known and should send addresses to Charles I. Berg, Secretary, 10 West Twenty-third St., New York City. C. I. Berg, *Secretary.*

WESTERN ASSOCIATION OF ARCHITECTS.

D. H. Burnham has resigned as Chairman of Committee on Uniform Contracts. S. A. Treat has been appointed in his place.

Normand S. Patton, *Secretary.*

COMMUNICATIONS

THE RELATION OF AN ARCHITECT TO A BUILDING-COMMITTEE.

Baltimore, January 14, 1888.

To the Editors of the American Architect: —

Dear Sirs, — Can you refer me to any case in which the power of Church Building-Committees over Architects has been defined, or state any facts relative thereto? A committee appointed me their supervising architect, according to written statement, "in usual professional manner." The contract with builder is in usual form, orders to be given as work progresses, on certificates that it is done according to plans and specifications, the architect having the right by specifications to give verbal orders. Now comes the rub: I have seen good reason, during the building operations, to make several deviations from written or drawn statements, not affecting design or cost, and adding to the goodness of the work. I am ordered by committee in writing to change all such proceedings and to do several things against my better judgment, one of which I explained my reasons for not doing and which I have learned since the drawings were prepared, it is impossible to do satisfactorily. They still insist. Is an architect to be governed by a committee in matters of detail, or is he, in his professional capacity, to act as a free agent? I may say also, that this committee has refused to pay my second order to the builder, just given him, because it is averred, I cannot state that the work is done by plans and specifications. The builder has given several things without additional cost, and there have been several extras ordered by committee and now in building. An answer in *American Architect*, to which I subscribe, as soon as you conveniently can will oblige me greatly. I am, Gentlemen,

Yours, etc., T. Buckler Ghequier.

[Committees whose acts are liable to review by others, generally object, with considerable reason, to deviations from plans or specifications officially approved, and it is but courteous on the part of the architect to consult them in cases where he thinks changes advisable, even though the contract may authorize him to vary from the drawings and specifications without first obtaining their consent. At the same time, if he thinks it necessary to make changes, either with or without their consent, the law unquestionably gives him the right, as the expert to whom the conduct of the building is entrusted, to do so at his best discretion, unless the contract provides otherwise, and not only this, but it requires him, as a part of his duty to his employers, to make such changes on his own responsibility in time to prevent evil consequences from neglecting them, and to remonstrate, clearly, and

with the authority belonging to his professional position, against any proceedings of his principals which seem to him likely to compromise the safety or convenience of their building. We remember hearing once of a French case where the architect was directed by his client to have certain changes made in a building in process of construction. He obeyed the order to the letter, and the building was injured in consequence; and the court held the architect responsible for the damage, on the ground that it was his province as an expert to foresee the consequences of the change, and his duty as a trusted adviser to warn his client of evil results which the latter, as a non-professional man, could not be expected to anticipate. This great and necessary authority, however, we must repeat, ought not to be used by the architect to the annoyance of his clients. Many contracts provide that the orders for changes given by the architect shall be subject to the consent of his principal, and he ought never to forget that he is employed, not to follow his own ideas at some one else's expense, but simply to carry out the wishes of his client in the skilful and prudent manner of which he is supposed to be master. Whether the client's object is, or is not, best secured by leaving a good deal of liberty to the architect is another question, but we should say that one who took the negative view of it would be sustained by the courts in requiring his architect to carry out any ideas which did not endanger the stability or durability of the building, or obviously expose its designer to ridicule or loss of professional reputation.—EDS. AMERICAN ARCHITECT.]

NOTES AND CLIPPINGS

A GOVERNMENT CLAIMANT'S PATHETIC STORY.—It seems to us that every one who has a printing-press at command should use it to bring about the righting of a wrong by informing some portion of the public that needless injustice is being done which it will cost the public nothing to set straight. W. C. Reed of San Francisco, a Government claimant, tells the following story in a petition which was presented to Congress recently, and has just been printed by order of the Senate:

In the year 1855 he chartered a vessel, loaded it with marine stores, investing his entire fortune in the enterprise, and set sail for Simoda, Japan, to establish himself in business in accordance with the treaty negotiated by Commodore Perry. He carried the necessary passport and papers, but despite treaty, passport, and papers he was refused permission to land. He called upon Commodore Rodgers, commanding the American naval forces, who assured him of his right to do as he had contemplated and who lent his best efforts to secure him in the right. After several months of diplomacy the Emperor made a positive refusal to permit the landing, and he turned homeward. Commodore Rodgers wrote him officially as follows: "I have sufficient forces at my command to enforce your rights, but I am not commissioned to declare war with the Japanese Government. I must therefore ask you to withdraw and return home. I report your case to my Government, to whom I refer you; but in doing so I am American enough to believe that it will fully indemnify you against your great loss." Reed returned to find himself $30,000 in debt for his vessel, with no market for the stores he had on board. He therefore sent the ship to the Okhotsk Sea to find a market, but she foundered on the way and he lost everything. He now sets forth that for thirty years he has been a petitioner for the redress assured him by Commodore Rodgers. He says the Department of State has declared his claim valid, and once it has been passed upon favorably by the Senate and once by the House, but never by both during the same Congress. He is informed that there is a fund of more than $1,000,000 in the possession of the State Department, being accrued interest on the Japanese indemnity fund, which no one claims. "Shall I," he concludes, "an old man now in want, fail of my rights because too poor and too feeble to vigorously urge my claim? May I not with hope and propriety ask of Congress to adjust my claim, take prompt action, and cause to be refunded the money so wrongfully wrested from me? I am the sole survivor of the expedition. Both of my Captains are dead. Commodore Rodgers is dead. My partner, T. T. Dougherty, is also dead."

GAS-TAR AND ITS USES.—On this subject the *Chemical Trades' Journal* reminds us that, besides the manufacture of varnishes, gas-tar is largely used in the manufacture of roofing-felt. The best factories, however, partially distil the tar, collecting the more valuable products, but there is no reason why, when tar is cheap enough, it should not be used in its virgin state. The felt is passed through the hot-tar and the excess squeezed out by rollers, which also causes the tar to permeate the interior of the felt. Tarpaulin and packing-cloth is generally made with wood-tar, but in some instances gas-tar has been substituted, but with no apparent advantage, as the latent coloring matters of the tar have sooner or later caused damage. The vapors from a tar-distillery are well known to cause paper, cloth and other textile materials to take a rosy hue, chiefly due, we suppose, to the volatile bases present, while pine wood in its new condition is deeply stained a deep yellow. When once formed, these colors are very permanent, and care should be taken that coal-tar is not used where it is likely to do damage. We have been informed that gas-tar may be employed for use in the "lucigen" and "luminator" lights with as much ease and safety as creosote. If this be so, there is another outlet for tar, which, up to the present, has been neglected. We fear, however, that warm tar would have to be employed, as cold gas-tar does not find its way very readily through small apertures. There are now many—very many—of these lights in existence, and it would be a very easy matter to get a trial made with tar in one of them.

THE DEATH'S HEAD IN CENTRAL AMERICAN ART.—One of the most common symbols that we find in Central America is the death's head, says the *American Antiquarian*. It is seen sculptured upon the side of the altars; also at the top of the idol pillars. It is also seen painted on pottery vases, and many other ornamental articles. It assumes a great variety of shapes, and sometimes is so complicated as to be with difficulty recognized. Stephens speaks of rows of death's heads of gigantic proportions, as seen half-way up the sides of the pyramid at Copan. He has also pictured an altar seven feet square and four feet high, with a death's head sculptured on the side of it at the same place. In this figure we see two bulging eyes, two large front teeth and the nostrils, and recognize the general shape of the skull. There is a resemblance between the eye of the skull and that of the god Tlaloc, and the question is, whether the skull was not intended to symbolize this personification of a Nature power, as Tlaloc was the god of the weather. In contrast to this are the heads and faces which Stephens describes as having such a remarkably serene expression. One is at a loss to understand why there should be such a contrast, but it shows that there was a design. Everything in the sculpture of this ancient people was significant. The death's head was made at least as terrific as possible; and the other head and face as placid as stone could make it, and the impression on the worshippers must have been marked.

TRADE SURVEYS

IF trade probabilities for midsummer and later were to be based upon facts and statistics and trade probabilities as they appear at present writing, they would be of a favorable character. The latest utterances of large manufacturing and buying interests are that there is a strong probability of a withholding of orders for the next six weeks. Even if these proved true, it does not argue anything against a healthy activity throughout the year. For reasons which some authorities attempt to set forth, there is just now a disposition to hold back large orders, and one of these alleged reasons is the uncertainty involved in the proposed discussion over tariff duties. The people at large are probably very little influenced by this. Confidence is strong in the consuming capacity and the necessities of the country, and the belief is general that mills, shops, factories and mines will be kept busy throughout the year in supplying these necessities. There is one position taken by the railroad authorities which is entitled to some respect, but the fact lies in giving it too much consideration, namely, that during the past two years future railway-building requirements have been sufficiently met, that new territory has been sufficiently covered, and that there are now very few probabilities of outside parties, as big railway managers call them, coming in to construct competitive lines between the Alleghany Mountains and the Pacific Coast in order to use them as nagging instrumentalities against strong corporations. It is true that during the past years especially a very large amount of Western railroad building was designed to forestall competition, but the limit of this kind of railroad building has been reached, yet how much of it will be done it is hard to say, but those who carefully follow the projection of roads and the movements of railroad magnates in Boston and New York are aware of the fact that a large amount of railroad building will at least be undertaken during the coming summer and fall. This enterprise will not manifest itself early in the season, as those engaged in it desire to see how things go before risking the expenditure of the necessary millions in this new, and for the time being, non-paying enterprise. The possibility of its heavy construction, however, should be taken into consideration now, in order to form a correct estimate of business probabilities for another year. A great deal of mineral and timber territory is to be opened throughout the country. Much of this territory will be opened by lines from ten to fifty, or, at longest, one hundred miles in length. The railroad companies having these schemes in hand so far have said very little about them, and, therefore, prophets of the business situation overlook this factor and underestimate the probable volume of business in steel rails, and in iron, steel and timber generally. The proof that there is a great deal of business of this kind in ambush is to be found in the fact that inquiries for large amounts of railway material and lumber have been made in Pennsylvania, Ohio and Chicago, and that half bargains or options have been entered into for a supply of material during the summer. It is, therefore, soon to say that while business probabilities in the railroad direction are not very bright, the actual results when the season is at its end may be surprising. Yet, to make things safe, it must be said that this contemplated building may not be undertaken and certainly will not be unless the situation later in the season shall justify it. House-building will be begun on as large a scale as last year and in several places on a larger scale. The improvement in this direction will be manifested in smaller manufacturing cities and towns. Where house-building was undertaken in one place on a large scale last spring, it will be undertaken in three or four this year. There is a very urgent need for small houses for laboring men in all newly-developed sections. A good many companies have been formed to build these houses, and they are generally composed of manufacturers who are interesting builders and capitalists with them. In addition to these, it is evident that there will be a great deal of building of churches and charitable institutions. Several Western cities have arranged for the building of fine market-houses. It is the intention of a good many large and small municipalities to spend money in improved pavements. A great deal of roofing material is also under contract, and all kinds of building material will be quite active. Our advices from a number of Western architects are of a rather favorable character. The great anthracite coal-strike at present writing is still threatening. The Reading Railroad authorities, for some wise reason, perhaps, are strongly opposed to concessions, but high commercial authorities give it out that the wages demanded will be quietly paid rather than let the strike spread. The iron and steel makers are all busy in a moderate way. There is no rushing demand. The lumber manufacturers are pursuing the logging operations in every part of the lumber field. The hardware manufacturers of the New England States are all working industriously. A good many new buildings will be started early in the spring in Connecticut and Massachusetts. A large amount of house and shop building will be done during the coming year in the New England States, but most of it will be by way of enlargement of existing capacity. The textile manufacturers, especially in cotton goods, are much pleased over the slight advance of one-half per cent in print and cotton goods and expect to be able to maintain it throughout the year. The textile manufacturing interests as a whole are in good shape. The good management of the Southern interests is leading to further investment of capital in the projection of new enterprises and the enlargement of old establishments. A good many labor strikes are threatened. Manufacturers, in view of the possible decline in prices, do not feel like yielding to the demands for an advance. There will be no serious disemployment of labor during the winter. The manufacturers, big and little, are more willing than they ever have been in years past to permit a moderate accumulation of stocks. There is, however, no disposition to accumulate beyond what prudence dictates, that is to say, there will be nothing like an overproduction in any line of trade.

S. J. PARKHILL & Co., Printers, Boston.

The American Architect and Building News.

Vol. XXIII. Copyright, 1888, by Ticknor & Company, Boston, Mass. No. 631.

JANUARY 28, 1888.

Entered at the Post-Office at Boston as second-class matter.

CONTENTS

It seems likely that the proposition which has more than once been made, that the Government of the United States should establish a Bureau of Fine Art to have charge of transactions by the public authority requiring a knowledge of this subject, may be definitely brought before Congress at the present session. While we should be very sorry to see an official board interfering with the teaching or practice of any sort of fine art in this country, it is certainly not to our credit that the most pitiable examples to be found in it of bad taste, and of gross ignorance and indifference in regard to subjects which even here are considered to form a necessary part of a decent education, are those presented by the works which are executed for the people of the United States by direction of the supreme legislative authority; and the provision of some sort of official board of reference, to whom might be referred, as is now done in New York, the question of the suitability of proposed plans for decorating the public property, would be an excellent thing. At the same time, we have very little expectation of seeing any such measure adopted at present. A large proportion of the people of the United States are at present in a condition of such absolute ignorance of everything relating to the fine arts that they cannot conceive that there is anything about the subject that they do not know, and this element is well represented in the national legislature. Moreover, with all of us, promotion to a position of authority is apt to bring with it a sensation of omniscience which naturally finds itself more at ease in dealing with matters of taste and feeling than those which are concerned with scientific realities, so that legislators who suffer occasional wounds to their complacency through mishaps about their representations of fact are likely to be all the more tenacious of their privilege of asserting themselves in matters where their opinions cannot be so effectually controverted. We all remember the governor who, when it was suggested that it might be well to have an expert opinion on the plans of a new State-house which was to be carried out under his administration, replied, with asperity, that he "would rather trust his own opinion than that of any four architects in the United States," and that the plans suited him; and this is too widespread a feeling among politicians to be easily overcome. Indirectly, perhaps, the result might be brought about more easily in another way. It is often proposed to hold the executive and the legislative branches of our Government more closely to their duties by giving the members of the Cabinet seats in the House of Representatives, where they will be ready to answer questions as to their acts. Whatever effect this change might have in other matters, it would be highly advantageous to the public administration of the fine arts. While Congress is impersonal and irresponsible, and can with impunity appropriate enormous sums of public money to buy worthless pictures executed by fascinating females with curls, a Cabinet minister could be brought to account at once, and an interpellation in the French manner, addressed to a high executive officer on the floor of the House by a clever political opponent, on the subject of a Vinnie Ream contract, or some similar transaction, would be a lessou which would not need to be often repeated.

The programme for the Second Annual Convention of the National Association of Builders of the United States of America has just been issued, and promises a most interesting meeting. The Convention, which naturally is composed of delegates from the various exchanges and other builders' associations, with their wives, who are thoughtfully invited as guests of the Association, meets in Cincinnati on Tuesday, February 8th. The session continues three days, but delegates are invited to remain over another day, Friday, in order to enjoy the hospitality of the members of the local organization. In addition to the regular business, which is likely to be this year of great importance, provision has been made for the reading of three papers, one on "Improvements and Advances made in Stone-cutting," by Mr. Charles F. Cheney, of Boston, the second on "Improvements and Advances made in Carpentry," by Mr. William Goldie, of Chicago, and the third on "Improvements and Advances made in Roofing," by Mr. E. E. Scribner, of St. Paul. These subjects, treated by experts, make the convention interesting to the outside world, as well as to builders and architects, and the latter will be hardly less curious to hear the discussions on the reports of the Committees on Uniform Contracts, on Uniformity in Lien Laws, and on Rules for Estimating Work, which are to be made at this session. Provision has been made for securing rooms for delegates at the Gibson House in Cincinnati, but in order to make sure of these the names of delegates should be sent at once to the Secretary, Mr. William H. Sayward, Boston, as well as to Mr. L. H. McCammon, Secretary of the Builders' Exchange, corner Sixth and Vine Streets, Cincinnati.

The Italian Government has attacked the subject of theatre construction in a new, and, we think, the only effectual way. In a circular addressed to all the prefects of the Kingdom, it calls attention to a new and brief regulation, under which every theatre hereafter built or altered must be entirely isolated, and possess on each front one or more doors giving access from the floor directly to the street. Besides these, there must be at least two doors leading from the outside directly to two or more staircases communicating with the boxes. These doors must be exclusively reserved for the use of the spectators in the boxes. It is forbidden to build more than three tiers of boxes above the ground-floor, but one gallery may be added, on condition that it is served by two staircases and at least two outside doors, exclusively belonging to it. All stairways and corridors must be wide and convenient, and all doors must open outward; and, for the benefit of the actors, a door must open directly from the back of the stage to the street. It is hardly necessary to say that such a theatre as this regulation prescribes, and only such a one, is, if constructed of solid materials, such as are used in Italy, practically safe, without the use of iron or asbestos curtains, sprinklers, automatic ventilators, or any other of the ingenious but unmanageable devices which, it must be said, serve mainly to delude audiences into a false sense of security. Whether it will be pleasing to the theatrical managers is another question. For a theatre with three tiers of boxes and a gallery it will be observed that the minimum number of outside doors permitted is eight, and as the law, unless intended to be simply a farce, must provide that all these shall be kept open during a performance, the management will be compelled, unless some method of ticket-taking not yet in use shall be invented, to maintain ticket sellers and takers at each entrance, to the serious detriment of the profits. In addition to this, the requirement that the structure shall stand on an isolated lot will drive the builders of theatres to the most costly sites, in place of the comparatively inexpensive ones which are now utilized for such purposes, and the interest account will be correspondingly increased. These considerations will undoubtedly lead to resistance on the part of managers to the regulation, and, if it is enforced, to the diminution of the number of theatres in Italy, but between the blessings

of having theatres numerous, and having them safe, we imagine that the public will in the end prefer the latter.

WE doubt if many persons know what the highest buildings in Great Britain are, or what they are used for. At present, the loftiest structure in the British Islands is the chimney of a fertilizer factory in Glasgow, which rises to the height of four hundred and sixty-six feet above the ground. The motive of its construction is, it seems, as unromantic as the object itself. The factory happened to be situated in the midst of a dense population, which, before the new chimney was built, complained bitterly of the stench from the burned bones and offal used in the manufacture of the fertilizer. The proprietors did not wish to move their business to a less thickly settled region, so, when the remonstrances of the neighbors became so pressing that they could no longer be disregarded, a compromise was made by which the manufacturers undertook to discharge the foul vapors from their processes so far above the heads of the citizens as not to be troublesome; and the chimney was built to effect this object. The celebrated chimney of the Saint-Rollox Chemical Works, also in Glasgow, which is four hundred and forty-six feet high, and was for many years the highest building in the world except the Great Pyramid, was also constructed for the purpose of discharging acid vapors out of the way of the townspeople, rather than with the idea of gaining a strong draught for the furnaces. It seems from an interesting article by Dr. Hector George, in *Le Génie Civil*, that the use of very high chimneys is likely to become more general, as their advantages are better known. For the present, it appears to be impracticable to get rid of noxious fumes from manufacturing processes. The combustion of coal alone not only sends into the air enormous quantities of carbonic acid, but of sulphurous acid, a suffocating and poisonous gas, of which nearly two million cubic feet are discharged every day by the chimneys of Manchester alone. Associated with these vapors, in places where soft coal is burned, are usually many tons of unconsumed carbon, in the shape of soot, which forms the most obvious, though not the most deleterious ingredient of a smoky atmosphere. Not long ago great efforts were made in manufacturing countries to suppress the smoke fumes, by requiring the use of "smoke-consuming grates" and other devices, but, according to Dr. George, these are almost abandoned, experience having shown that careful firing, in which the coal is spread evenly and thinly over the grate bars, will do more to prevent smoke from it than any consuming device yet invented. In fact, the interesting competitive tests between stokers, with the pressure exerted upon them by their employers, who sometimes deduct from their wages a part of all fines imposed for allowing smoke to escape from the chimney, have made a change in the practice of that modest profession, and furnaces are now so managed, with the ordinary appliances, as to throw off no unconsumed carbon. The incombustible gases, however, are discharged in greater volumes than ever, scattering sulphuric, nitric, carbonic, hydrosulphuric and hydrochloric acids through the atmosphere; and the best method of obviating bad effects from them is found to be by exposing them to the greatest possible amount of dilution and condensation before they reach the earth by pouring them out into the atmosphere at as great a height as possible. One of the sources of noxious vapors which Dr. George mentions is new and curious. It appears that the demand for artificial hair in Europe is now so great that it cannot be supplied from the home markets, and great quantities of human hair are imported from Japan, China and India. Naturally, the black locks of the Asiatics do not match well with that of the European customers of the Paris wig-makers, and it is necessary to color them, which is done by boiling them in nitric acid until they are bleached to the required tint. This process develops quantities of nitrous acid vapors, which are suffocating to the persons engaged in the work, although not very dangerous to those at a distance.

EVERY one has seen some of the wide planks of redwood which occasionally appear in the Eastern markets, but few persons outside of California know the gigantic dimensions in which redwood lumber may easily be obtained from mills which possess machinery capable of sawing it. We remember seeing once a solid redwood plank five feet wide, which was the admiration of the building portion of the town for a time; but, according to the *California Architect*, this was small compared with some to be had in the vicinity of the redwood forests. Not long ago the managers of a State fair in California sent circulars to the saw-mills, inviting exhibits of redwood planks. In response to this a certain mill sent a "good-sized" plank, which measured six feet in width. Hearing of this, the proprietors of another mill worked up some planks eighty inches wide, and sent samples for exhibition; and soon afterwards a third establishment, the McKay mill, forwarded a lot of perfectly clear, sound planks and boards, varying in width from ten to eleven feet. If there were any special demand for such enormous pieces of this unrivalled timber, they would be more frequently seen, but the wood construction of the world has for a thousand years been based on the assumption that sawed sticks measuring more than twelve inches in breadth or depth of section would be costly, and difficult to obtain; and a new system must be made to suit the materials of the Pacific coast, or the redwood logs will continue to be subdivided into pieces approaching in size the Eastern lumber. On the other side of the water, the standard of size for framing timber is still smaller than with us. If we are not mistaken, few mediæval cathedrals on the Continent contain a stick larger than eight inches square in cross-section, and, although English timber was of larger dimensions a thousand years ago, there would be little difference now.

IN regard to the same matter of redwood lumber, another article in the *California Architect*, in the shape of a letter from a manufacturer of furniture, gives a suggestion which ought to be valuable. This gentleman, having worked redwood of all sorts, has found, as might be expected, that the lumber from the root, or from the trunk just above the root, is far more beautiful in figure, and more suitable in other respects for his purpose, than that taken from the upper portion of the tree. In consequence of this observation, he has been accustomed to visit farms in the redwood district, from which the timber had been cut, and offer to remove the stumps. These, in most cases, have been left in the ground, the cost of extracting them, or blowing them to pieces with gunpowder, having deterred both the lumberman and the farmer from meddling with them, while the latter, remembering the spruce stumps of the East, has comforted himself with the expectation that they would soon rot away. Unfortunately for this theory, the redwood is very durable, and as a quarter of a century has passed over many of the stumps without producing any symptom of decay in them, the farmers have become tired of ploughing around them, and are glad to accept a proposal to take them away. On his side, the furniture manufacturer finds himself abundantly supplied with the material he likes best, at the cost of getting it, and finds it, when worked up, so useful and popular that he seriously asserts that by proper treatment the stumps alone on a farm in the redwood region "can be made to bring more money than the price of the land and the value of the timber which has been cut from it." Extravagant as this claim seems, the experience of the farmers in the black-walnut district of Ohio indicate that if not entirely reasonable now, it is likely to be so before many years. Hundreds of Ohio farmers, who have toiled half their lives in clearing their land and "improving" it by cultivation, would be far richer to-day if they had never touched it at all; and if there had been any with taste and foresight enough to leave some clumps of the beautiful black-walnut trees to diversify their farms, and had used a little forestry science in managing them, they would by this time have found the crops from the uncleared land by far the most valuable resource of the estate. To us there is something sad in the sight of an agricultural region, which has once been enthusiastically and laboriously denuded of its forests, reverting, as southeastern Massachusetts now is, to the slow and painful cultivation of the same forest-trees which were cleared away with such zeal by the men whose grandsons can find no more profitable crops to grow on the farms which they have inherited than the very trees which their ancestors exterminated with axe and fire. Moreover, the descendants of the Pilgrims are glad to sell the knotty, defective product of their "second growth" forests for one-third the price that the timber from their grandfathers' trees would bring if it had been let alone, and the Ohio farmers, when they return to the cultivation of the black-walnut, as they probably will, are likely to get a similar lesson on the value of moderation in throwing away one's present blessings for the sake of making room for possibilities of fortune of some other kind.

OPEN-TIMBER ROOFS OF THE MIDDLE AGES.[1]—II.

(*B*) *Roofs without Tie-Beams.*

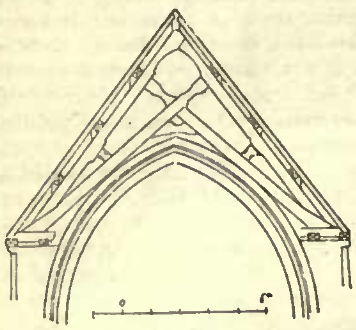


Fig. 19.
[After Viollet-le-Duc.]

THE invention of roofs without tie-beams is sometimes said, however, to have resulted from the substitution of stone vaults for wooden roofs. This statement is obviously based on the assumption that the vaults rose above the level which would be occupied ordinarily by the tie-beam (Fig. 19). The cathedral of Autun and the churches of Beaume and Sanlieu are cited by Viollet-le-Duc as examples of this kind of vaulting. Such construction, however, was exceptional. In the vast majority of instances the vaulted ceiling will be found to rise no higher than the feet of the rafters. A typical example is that given in Figure 1, [No. 630.]

Roofs without the tie-beam are of rare occurrence in France.

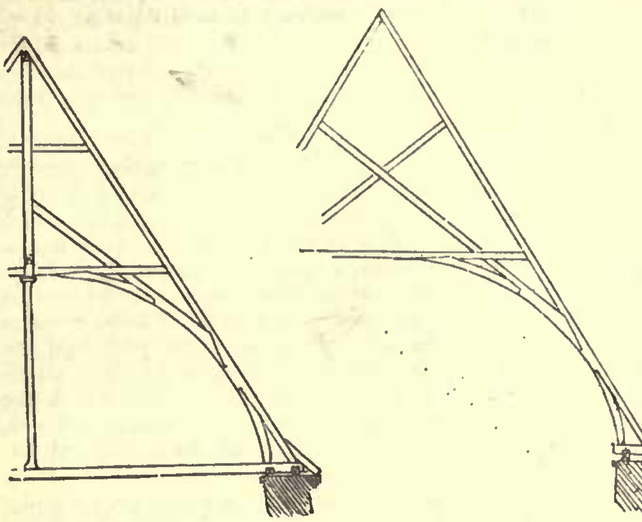


Fig. 20, *a*. Fig. 20, *b*.
[After Viollet-le-Duc.]

Like the Romans, the French never made much of a departure from the simple king or queen post truss. In the roof over the Episcopal Palace of Auxerre there are some trusses without the tie-beam (Fig. 20, *a* and *b*). This roof is noticeable for its steepness, its lightness, and elegance, and also for the introduction of inclined cross-braces, which throw the framing into a system of triangles, thereby greatly increasing its rigidity. But if we wish to see good examples of roofs without the tie-beam, we must go to England. "*Si nous voulons voir des charpentes apparentes dont l'ecartement est maintenu sans entraits, et au moyen d'un système d'assemblage different de ceux que nous venons d'examiner, il faut aller en Angleterre*" (Viollet-le-Duc). The English roofs of the Gothic period are generally without the horizontal tie-beam, and for nicety of execution and elegance of form are unsurpassed.

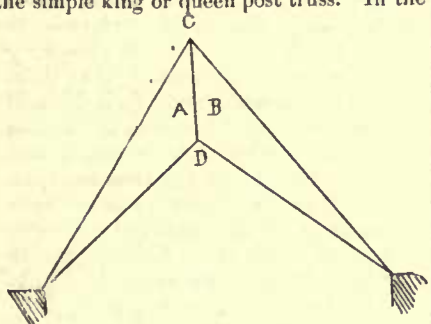


Fig. 21.
[After Viollet-le-Duc.]

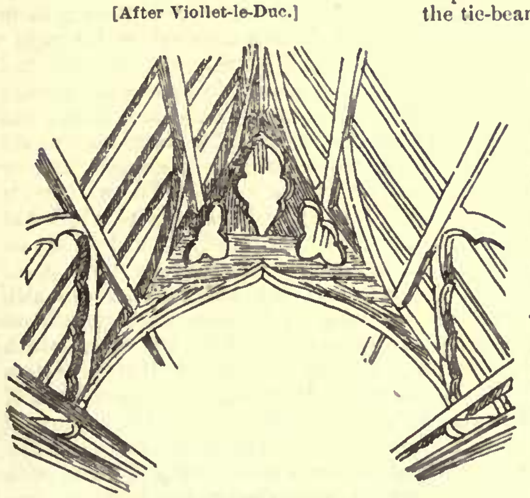


Fig. 22.
Malvern Abbey. [After Viollet-le-Duc.]

(*B* 1) *Trussed-Rafter Roofs.* — In order to get rid of the tie-beam, says Viollet-le-Duc, the Anglo-Normans had to solve this problem, viz., to give to the triangles *A* and *B* (Fig. 21) a common base, *CD*. When this was done the tie-beam could be dispensed with. The roof over Malvern Abbey (Fig. 22) is a good example of one solution of this problem. The merits of this design, however, are more than counterbalanced by its defects. Extravagance of material is not a feature of any good design. Due regard must be had for economy in the sense that all material used in addition to the amount required for stability should be offset or compensated for by the attainment of some desired effect, as dignity or grandeur. The end should justify the means. In a good timber roof, for example, strength and lightness must be combined, the one being essential to safe construction, the other to artistic effect.

The heavy and oppressive effect of the early roofs has been referred to. The roof at Malvern Abbey is an example of one of the first attempts to overcome this defect, but the construction of this roof calls for an excessive amount of timber, making it so heavy that it could never be used for anything but a small span. Moreover, it was expensive to a degree that may be fairly considered inadequate to the result obtained. The tie-beam was dispensed with, but at too great a sacrifice of economy, and the depressing effect of the tie-beam roof had been only partially done away with.

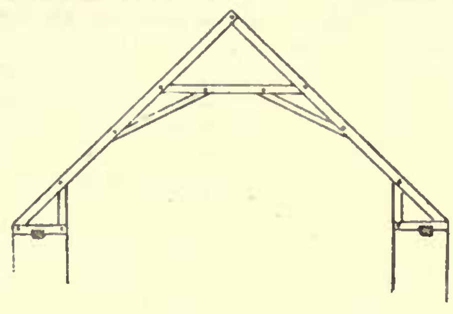


Fig. 23.
[After Tredgold.]

The practical solution of the problem was found in what is known as the "trussed-rafter" roof, which was much used in the Early English and Decorated periods. The general scheme of its construction is shown in Figure 23. Every pair of rafters is provided with a collar-beam and braces. The latter may be straight or curved and above or below the collar-beam. The trussed-rafter roof is distinguished from all other roofs without tie-beams in that it is a single-framed roof — that is, one in which every pair of rafters is trussed, there being neither purlins nor principals. There is, thus, no really characteristic form for this roof. In practice, however, it must be necessarily a simple one, for anything elaborate, repeated as it would have to be with every set of rafters, would prove very expensive and at a certain point a different kind of roof would recommend itself as giving a better effect with the same amount of material. Where the braces are curved, the effect of an arched ceiling is obtained, and if in this case the roof be sheathed, a wooden barrel-vault is produced. Polygonal-shaped ceilings (often called wagon-headed roofs) are of more frequent occurrence. The trussed-rafter roof thus admits of great variety in treatment inasmuch as it is purely a question of taste where the ceiling shall be put. (See Figs. 24, 25, 26.) Brandon holds to the opinion that originally none of the roofs of the trussed-rafter form were intended to be sheathed. In modern roofs, however, it is oftener done than not.

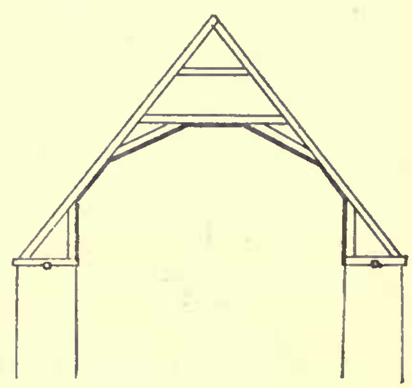


Fig. 24.

(*B* 2) *Hammer-Beam Roofs.*—The general principles of hammer-beam construction are shown in Figure 27, in which *HH* are the hammer-beams, *WW* the wall pieces, *BB* hammer-beam braces, *SS* hammer-beam struts, *C* collar-beam, etc. The ordinary form which this roof takes is shown in Figure 28. It will be seen that the construction of this form of roof is based on that property peculiar to the triangle, namely, that the angles cannot change so long as the sides remain of the same length. In the hammer-beam roof, the various timbers are so arranged as to form triangles. The joints at the angles are thus

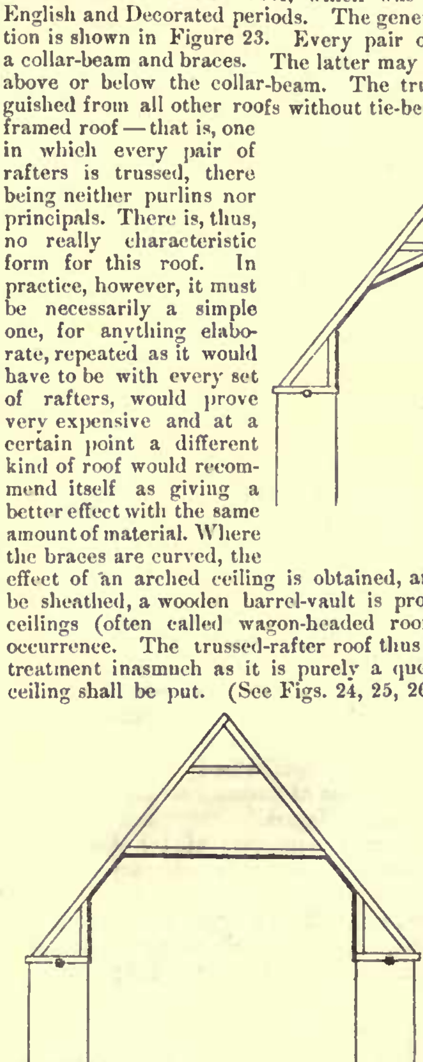


Fig. 25.

[1] Continued from No. 629, page 17.

rendered immovable and the rigidity of the framing is secured. In regard to the origin of the roof there have been several theories, but that advanced by Brandon seems to be the most reasonable. According to his theory the hammer-beam was developed directly from the triangular foot of the trussed-rafter roof (Fig. 29). This was used merely on a much larger scale, being made to project inwards and supported by a brace on the under side. That view of the hammer-beam roof which considers it a tie-beam roof with the central portion of the tie-beam cut out as it were, he proves to be erroneous inasmuch as it can be shown that the tie-beam roof had been discarded before the hammer-beam was introduced. The fact seems to be that neither the tie-beam nor the trussed-rafter roof were suitable for anything but moderate spans. A new form of roof had to be devised in order to meet the requirements of larger spans. Progress rarely, if ever, goes by leaps; it is gradual and proceeds by the improvement of existing forms, not by the direct invention of absolutely new ones. Accordingly, the particular form that the new roof took was probably suggested, in parts, at least, by the form of roof last in use, namely, the trussed-rafter.

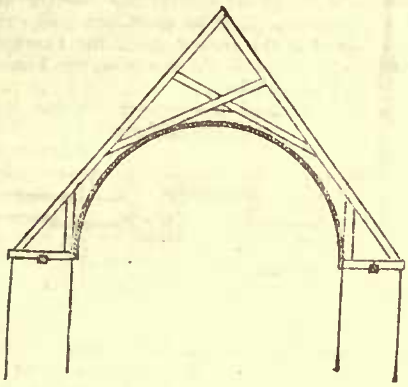


Fig. 26.

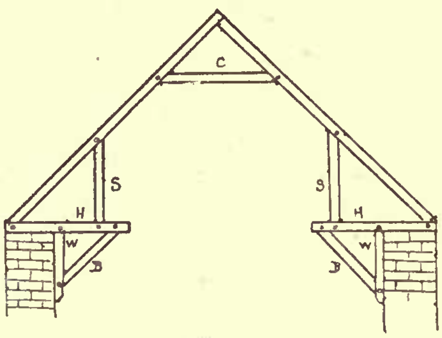


Fig. 27.
[After Tredgold.]

The hammer-beam is really a bracket or cantilever upon which the roof rests. Practically, it reduced the actual span of the roof, for it gave excellent support to the rafters at their weakest point, namely, near their feet. That is to say, as far as the rafters were concerned, the span was really only the distance between the hammer-beams. Thus a rafter of a given section which would be proper for a given span when used in a hammer-beam roof would for the same span when used in a tie-beam or trussed-rafter roof have too great a tendency to bend or sag. In other words, with timbers of a given section a larger span was possible than before.

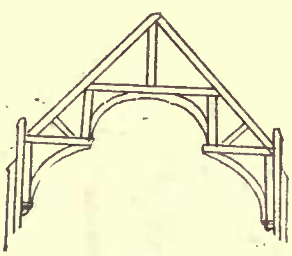


Fig. 28.
[After Tredgold.]

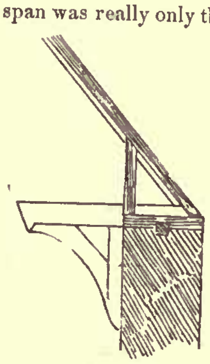


Fig. 29.
[After Brandon.]

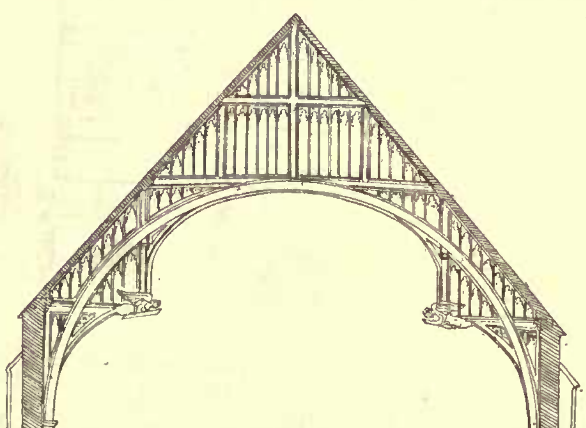


Fig. 30.

Westminster Hall. [After "*British Carpentry*" by Smith.]

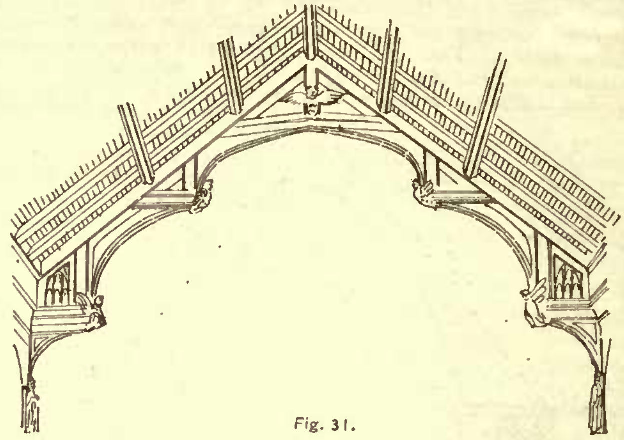


Fig. 31.

Nave of Knapton Church, Norfolk, Eng. [After Brandon.]

The new form of roof was also controlled to a certain extent by the character of the buildings erected at this time. In the Perpendicular period walls were pierced by large, lofty windows and strengthened in the spaces between the openings by narrow buttressed piers. The trussed-rafter roof, which practically required continuous support, thus became impracticable. The new roof had, of necessity, to be one which could be supported at intervals. Moreover, the oblique thrust which the hammer-beam, in common with all roofs without a tie-beam, had a tendency to exert, was well met by the buttresses. Nor did these have to be built higher than before, for in this roof the thrust was brought well down on the wall. This style of roof, therefore, had many good qualities to recommend it. The rafters were well stiffened; the thrust of the roof was made not only more nearly vertical than it had been with the trussed-rafter roof, but was also brought lower down on the walls where it could be easily met by greater lateral resistance; the construction was of such a nature that it could be executed by a combination of small pieces; and finally, its great beauty, as much as anything else, perhaps, brought it into great favor.

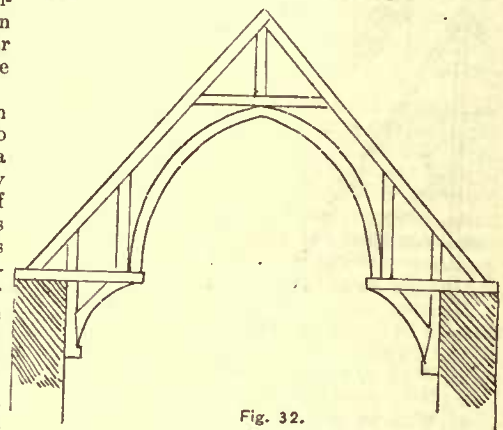


Fig. 32.

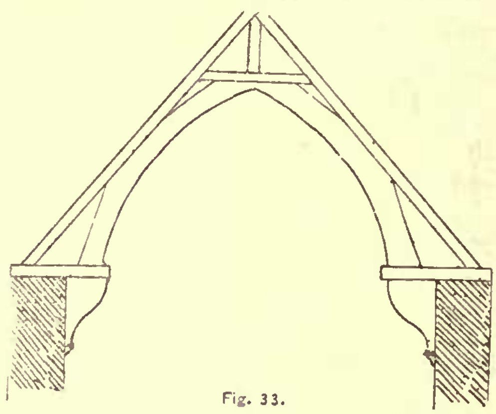


Fig. 33.

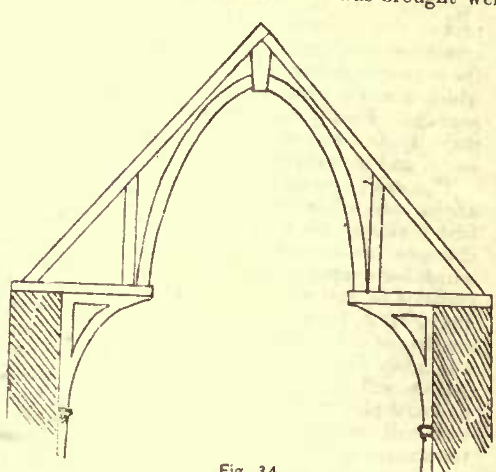


Fig. 34.

The largest and most magnificent specimen of a hammer-beam roof is that over Westminster Hall (Fig. 30). This roof covers a hall two hundred and thirty-nine feet long by sixty-eight feet wide. A striking feature is the large timber arch which spans the entire width of the hall. This arch obviously plays an important part in the construction and is not merely decorative. What is a most singular fact is that this roof (1397) is the earliest known specimen of

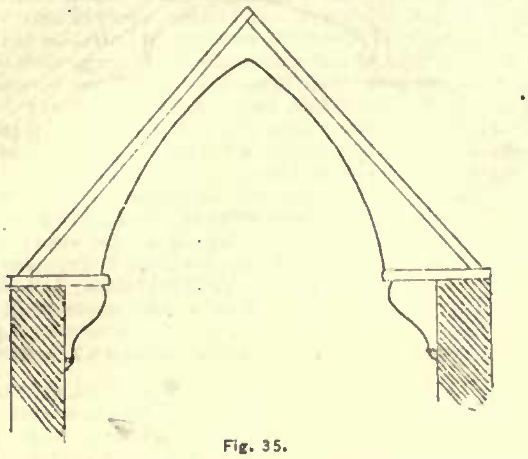


Fig. 35.

the hammer-beam variety. It is scarcely possible, however, as Brandon observes, that a design so bold, complete and successful could have been among the first to have been executed. Beautiful specimens of hammer-beam roofs of more moderate spans are found in the churches of Norfolk and Suffolk. Many of these have a second hammer-beam introduced (Fig. 31). The multiplication of hammer-beams can hardly be considered an improvement, for, though it gave greater richness of effect, it did not bring increased strength to meet the greater weight thus given to the roof.

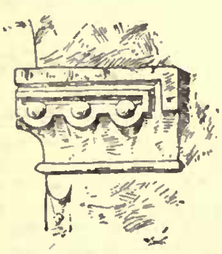
Hammer-beam roofs almost defy classification, but the following list will be found to comprise nearly all the different varieties.

1. Complete — with braces, struts, as in Figures 28 or 32.
2. With no struts, as in Figure 33.
3. With no collar-beam — braces curved to ridge, as in Figure 34.
4. With no collar-beam and no struts, as in Figure 35.

[To be continued.]

PARIS GOSSIP.

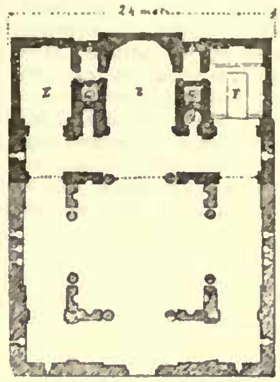
THE NEW CREMATORY. — EXHIBITION OF PUVIS DE CHAVANNES'S DESIGNS.

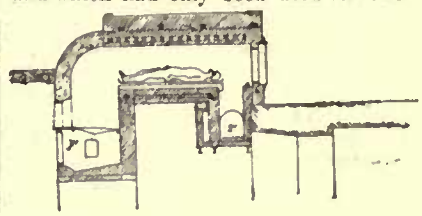


CAPITAL FROM DEERHURST CHURCH

ON the 25th of October experiments the results of which were not absolutely satisfactory were made at the crematory recently built at the cemetery of Père Lachaise. On the 15th of last month I was present at the new experiments which produced better results. A society for the propagation of cremation, founded in 1880, and comprising a number of experts, have made an active crusade in support of this reform. In 1883 the Council of Hygiene concerned themselves with it, and after several examinations, discussions, and reports approved, in 1881, the selection of one of the lofty portions of the cemetery of Père Lachaise as the site of three crematory furnaces. These furnaces were to serve for experiments and the destruction of bodies which had already been used for anatomical purposes. On the 27th of July, 1885, the Municipal Council approved the construction of a funerary building, with apparatus for cremation, and authorized the immediate execution of that part of the project necessary for the incineration of refuse from the hospitals, which reach a total of about three thousand bodies a year on the average. Finally, on March 30, 1886, the Chamber voted by a large majority, freedom of choice for every individual of full age between burial and incineration in his own case.

The design adopted has a monumental aspect, and the general appearance will be very imposing. The authorities have felt that to the first device of this kind erected in France there should be given such character as to make an impression on that portion of the public which feels repugnance for this system of destroying corpses. The estimate of cost was 629,274 francs. The architect of the Ville de Paris, M. J. Formigé, was the one charged with its construction. It consists of a ground-floor with vaulted galleries, whose use is not yet absolutely fixed upon. This ground-floor will form the sub-basement. Above will be the rooms that are intended for the public. The annexed plan gives the arrangement of the first story. A large central hall covered by a dome and surrounded by large galleries, terminates in three hemicycles, each of which is to contain a crematory furnace. This story will be reached either by a grand incline of gentle slope or by staircases. These details are still to be studied. The part actually built contains only the three hemicycles which enclose the furnaces, only one of which has been installed up to the present time — a furnace of the system Gorini, adopted in Italy, built of brick, and arranged as the annexed section shows. The hearth F at the level of the ground-floor is fed with wood. The flame, stimulated by a strong draught mounts in the chamber, licks the body lengthwise, and descends to the entrance of the chimney-shaft T. The body is placed on a dish of sheet-iron and covered with asbestos cloth. This dish, running over a system of rollers and dragged by a chain which crosses the furnace, is thus introduced into the chamber. The material now used is only experimental. It has certain inconveniences. The sheet-iron dish, subjected to the great heat of the furnace, yields rapidly. The one which I saw, and which had only been used for two

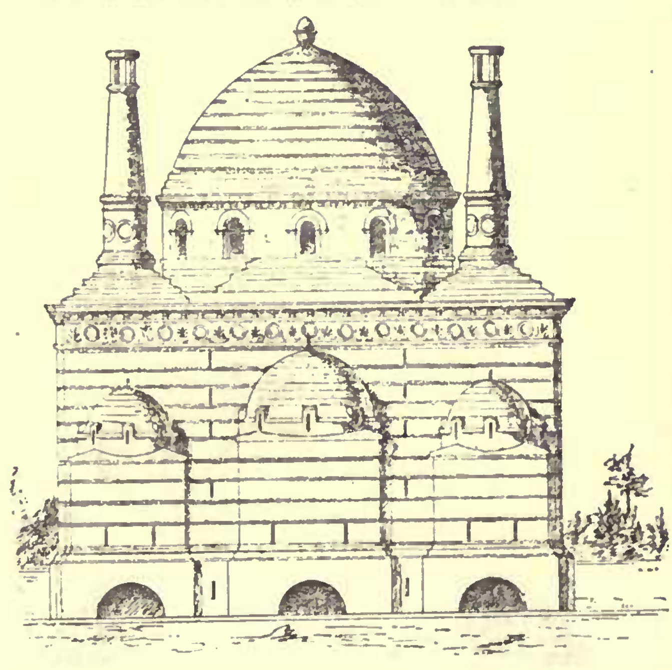




experiments, was already warped and covered with scales. When the arrangements are finally completed they will be compelled to use everywhere that may be possible apparatus made of infusible clay. It is likely, too, that the system of Gorini will be replaced by that devised by Siemens, which employs gas, and is far superior; but still it was interesting to observe that already good results were obtained with the system of Gorini.

Three or four hundred kilogrammes of wood were needed for the incineration of a single body. The flame traverses the furnace as I have described, and gas and fumes disappear up the chimney-flue. To prevent any dangerous gases, given off during combustion of the body, from vitiating the surrounding atmosphere, a grate fed with coke is fixed at a certain height in the chimney-flue. The putrid gases are burned while passing through this fire, which serves at the same time to accelerate the draught of the main furnace. Experiments made at the mouth of the chimney upon the gases which are delivered from it have shown that in point of view of hygiene they no longer contain any deleterious principles. Experiments made on the 15th of December before some members of the Academy of Medicine and the Municipal Council, and at which I was present as correspondent of the *American Architect*, gave the following results: The average time required for the incineration of the body is one hour and three-quarters and upwards in a furnace raised to the temperature of six or seven hundred degrees [centigrade]. The resulting relics were some fragments of bones resembling pumice-stone and very friable. The portions upon which the fire had the least effect were the teeth, vertebræ, the hip-bones, as well as the joint of the tibia and the thigh. These fragments weighed about two kilogrammes.

I enclose a sketch of the rear elevation of the monument as it was



first arranged by M. Formigé. In execution certain modifications have been introduced. The chimneys have been brought in between hemicycles, as is indicated upon the plan, which is exact. The architect, by employing bands of black stone, has secured a decorative effect very much in keeping with the character of the building.

The estimated expense of the portion actually built was 245,975 francs, and up to the present time it has not reached the sum of 200.000 francs.

This building, when it shall be complete and crowned by its dome, will surely have an imposing air still more enhanced by the columbarium already projected, in which will be arranged niches for the reception of funerary urns: this columbarium will surround the furnace-building proper. But it will probably be a long time before the practice of cremation becomes a matter of daily occurrence: already it has encountered numerous adversaries, who attack it from different points of view, one of the most serious of which is the impossibility in criminal cases of deriving proof from autopsies. Cremation will be under the control of regulations, whose discussion will consume much time in a country where different societies and commissions play so important a rôle, and where the least undertaking gives rise to such numberless reports. More than this, it will be necessary to overcome the violent opposition of the Church and the deeply rooted prejudices of the people.

During the month of December took place at the Gallery Durand-Ruel the exhibition of paintings, pastels and drawings of Puvis de Chavannes. It was interesting to see here brought together the different works of this artist, so unequal, and so unequal in a wholly voluntary fashion. This, at any rate, is the notion which naturally comes to you when, at the side of his magnificent drawings in red chalk, so solid, and recalling as they do those of the greatest masters, you find compositions of such poverty and such slip-shod drawing.

M. Puvis de Chavannes has his admirers, who follow him everywhere, and sustain him through thick and thin. These admirers have the audacity to try to make us understand and appreciate, for example, "The Poor Fisherman," that absolutely bad painting of the *Salon* of 1881. I am free to say that they will have their trouble for their pains. Fortunately, M. Puvis de Chavannes, who is an artist of distinguished worth, has done other work upon the merits of which everybody is agreed, and several of his decorative paintings are very fine. They have in every case that soft color which is so harmonious and goes so well with architectural surroundings. All the same, there is need of an architecture of peculiar character, antique and solemn, for M. Puvis de Chavannes does not vary his style. It is grand in sentiment, but always a little mystic. There is need of the grand, calm lines of religious or academic architecture to put his talent at ease with itself and produce its best results. His paintings at the Panthéon are magnificent, and we have seen with pleasure the reduction. The same may be said of the paintings for the Museum at Amiens — "Repose," "Labor," "War" and "Peace." These four compositions are superb. This is truly grand decoration. They are well grouped, and vie in color and drawing. The studies made for them in red chalk are superb.

I will mention once more the "Women on the Sea-Shore" (they were shown at the *Salon* of 1879), which has a graceful movement and an agreeable tone. The reduction of a large painting, "Autumn," is very pretty and decorative; a fine nude torso in pastel, and the very beautiful and the very pure drawings for the mural paintings of the stairway of the Hôtel de Ville at Poitiers "Radegonde in the Convent of St. Croix," and "Charles Martel victorious before Poitiers," and finally some figures for his beautiful mural paintings on the Staircase of Honor at the Palace of Longchamps at Marseilles, and that for the Museum at Lyons. What difference between "The Young Mother," harsh in drawing, "The Prodigal Son," *Salon* of 1879, and "The Decapitation of St. John the Baptist," from the *Salon* of 1869, which the partisans of M. Puvis de Chavannes nevertheless count among his fine paintings. This one lacks air and is disagreeable in color. I do not care much more for his figure of "Hope," which hung at the *Salon* of 1872, in which I find, nevertheless, a background which is perfectly ravishing.

Finally, must we admire the great canvas styled "Sleep," which is little known, the artist having kept it in his studio since the *Salon* of 1867, to which he had sent it? The composition is not good. A group of persons asleep occupy the right of the painting. This group is confused and too crowded; other personages sleep in isolation on the left. There is no bond in the arrangement, no *ensemble*, but on the horizon above the sea arises an enormous half moon. It lacks sentiment, and it is impossible for me to discover in this work that poetic and tender conception, which some of the privileged pretend to discern there.

In spite of these inequalities the exhibition was interesting, for M. Puvis de Chavannes evidently must be counted among our masters of decoration. He is an artist of originality and conscientious, whose name is attached to magnificent works, and who has that conviction and veneration for art which have always a right to our respect.

THE ILLUSTRATIONS

[*Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.*]

CHURCH OF ST. JOHN THE BAPTIST, QUEBEC, CANADA. MR. J. F. PEACHY, ARCHITECT, QUEBEC, CANADA.

[Gelatine Print issued only with Gelatine and Imperial editions.]

"GREENE'S INN," NARRAGANSETT PIER, R. I. MR. WM. GIBBONS PRESTON, ARCHITECT, BOSTON.

THIS building is the result of an effort to produce a hostelry promising some of the creature comforts so commonly found in the smaller hotels of England and which the great caravansaries lining our coast are the farthest possible from furnishing. In addition to being a noted and delightful summer resort, Narragansett Pier, like Newport, has a mild and bracing winter climate, owing to the proximity of the Gulf Stream, and it is the intention of the owners to offer an attractive and comfortable house for invalids or others desiring a change from their home life without the necessity of a journey to Old Point Comfort, for example. Hence the *Solarium*, which is on the south-east corner and is a great glazed piazza, with sashes removable, shingled within, a fish-net covering the ceiling and containing a wide, open fireplace built of field-stones and beach cobbles. In summer the sashes can be removed and the Solarium will then form part of the front veranda. A former building will be used for kitchen, laundry, etc., and during the winter the large dining-hall will be disused and the smaller south dining-room take its place. Chimneys, foundations, etc., are of field-stone; walls shingled; belt above Solarium, mortar on wire lathe, with scratched design.

THE PARIS OPERA-HOUSE, AFTER AN ETCHING BY J. A. MITCHELL.

JOHN AMES MITCHELL was born in New York in 1845. He studied architecture at the École des Beaux-Arts from 1867 to 1870, and then practised his profession in Boston for six years. During this time he built a church in North Easton, Mass., a library at Randolph, Mass., a church in Halifax, N. S., and many houses. In 1876 he again went to Europe and studied painting in Paris under Lefebvre and Boulanger, and etching with Brunet-Debaines until 1880. He then returned to New York and in 1883 founded *Life*, the well-known comic journal of which he has since been editor.

In addition to the "Paris Opera House," which we reproduce by the kind permission of M. Rouam, the publisher of *L'Art*, Mr. Mitchell has produced the following etchings: "The Door of a Church at Châteaudun" (from a drawing by Brunet-Debaines); "The End of the Act"; "A Political Marriage" (from his own painting), and ten sketches of the Paris Exposition of 1878.

Looking at the many merits of the admirable plate before us — its sense of light and space, the well-rendered types of Parisian life in the foreground, and the exceedingly clever drawing of the architecture — one wishes that Mr. Mitchell had given us more work in this direction and that the products of his art were not confined now to an occasional bright drawing in the pages of *Life*.

Ten years ago when this print was made, but little had been done of the mass of brilliant work which we can now point to as the production of American etchers, and if the "Paris Opera House" has since been equalled as an architectural etching by an American artist, it has certainly not been surpassed.

BUSINESS BLOCK DESIGNED BY MR. A. B. STURGES, CLEVELAND, O.

PART OF THE FACADE OF THE UNIVERSITY, SALAMANCA, SPAIN.

THE HOLBEIN MADONNA.

CAPITAL FROM DEERHURST CHURCH

AMONG the events of the year just ended, there was none so important to the credit of art-criticism as the identification of the Darmstadt Madonna, through the cleaning of the painting by Hauser in Munich.

The public accedes to the superior general knowledge of professional critics, but that insight of connoisseurs as to this touch of the brush having been made or not made in this or that century by this or the other master is felt to have no substance, or a substance so very superfine as to irritate robust common sense. So, too, with this old controversy as to whether the Madonna in Darmstadt or that in Dresden is the original by Holbein.

Americans know the picture. In the Dresden gallery it is the only painting besides the Sistine Madonna of Raphael that has a room almost to itself, and it has belonged to the collection for over a century. All the world valued it as having been from its origin the most renowned work of Holbein, and the masterpiece of Classic German art, just as Raphael's Madonna is of Italian art. When a second picture turned up and critics claimed that it and not the Dresden one was the famous original, the world was impatient enough at their cavilling. Curiously, however, after having gathered proofs from history (the Darmstadt picture can be traced back with tolerable connections through many hands, whereas there is a great gap in the past of the Dresden one), from the looks, the technique of the picture, from its old frame (which was stamped with the coat-of-arms as was claimed of one of Burgermeister Meyer's kinsmen), they have now been proved right by the texture, so to speak, of the picture.

Holbein's painting was finished in Basle in 1526, shortly before his journey to England. It had been ordered by the Burgermeister

AMERICAN ARCHITECT AN

COPYRIGHT 1888

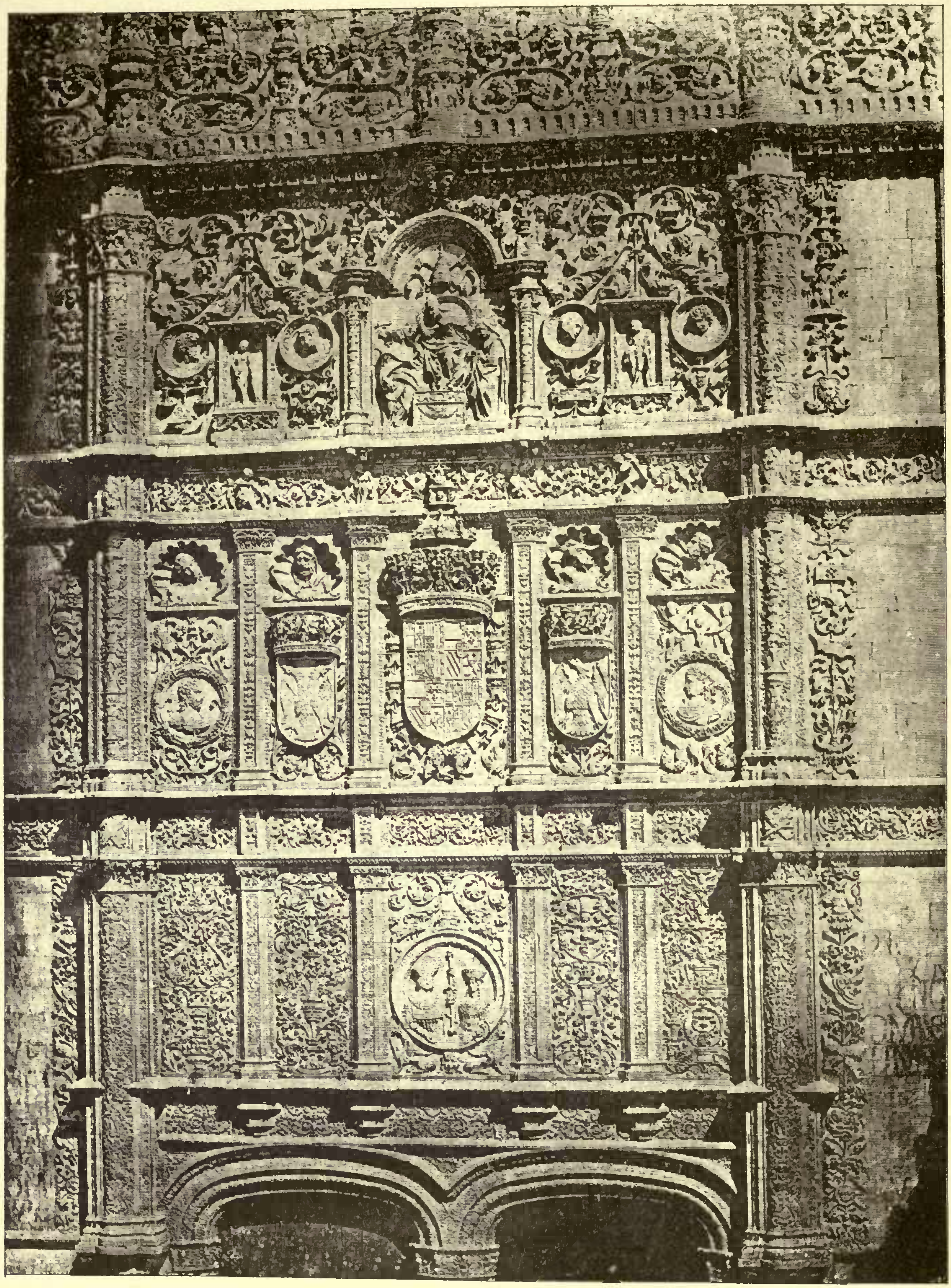
Grand Opera House, Pa

NOR & CO

Heliotype Printing Co. Boston

After an etching by U. A. Mitchell.

COPYRIGHT 1888 BY TICKNOR & Co



Heliotype Printing Co. Boston.

From the façade of the University, Salamanca, Spain.

Heliotype Printing Co. Boston

AMERICAN ARCHITECT AND BUILDING NEWS, JAN. 28 1888.

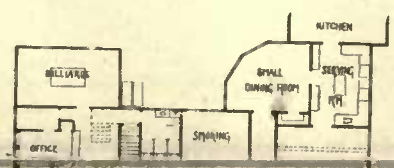
COPYRIGHT 1888 BY TICKNOR & Co

"Greene's Inn."

Narragansett Pier. Rhode Island.

Wm Gibbons Preston, Architect.

· 1887 ·



Copyright 1888 by Ticknor & Co.

Design for Business Block. By A.B. Sturges Toledo O.

Heliotype Printing Co. Boston.

Hans Meyer — one tradition says to show his attachment to the Church at a time when Protestantism was becoming the vogue in Basle, and another as an offering of thanks to the Virgin for having cured the lame left arm of his sickly baby. The whole family are grouped before the Madonna, the Burgermeister, his two sons, his wife with her daughter Anna, and his dead first wife. The mantle of the Virgin spreads itself protectingly towards the group, and the child on her left arm stretches his hand over it. What has always made the picture so renowned is its wonderful domesticity of air. The Madonna with her blond almost imperceptible eyebrows and floating blond hair is stiff; but her stiffness, her passive mildness and imperfect grandeur answered exactly, one felt, to the ideal of the Virgin in the mind of this lumbering, brave, honest-souled Burgermeister, who looks up to her with folded hands and ardent childish expectancy.

It was the one Madonna in the world that spoke, in spite of its old-fashionedness, to the Germanic heart of respectable, family, everyday piety. Raphael's Madonnas have a grace that is poetic; Murillo's are dark-eyed girls of half gipsy blood — they convey no sense of well-ordered family life; and as for Van Eyck's and Durer's, they have too much gold drapery and state. Connoisseurs marvelled at the solidity of the painting, the life-likeness of the personages, the perfect mastery of anatomy and grouping.

The first striking difference between the Dresden picture and the new one that had been brought by Spontini for his brother-in-law, the Paris art-dealer Delahaute, to Berlin, and sold to Prince Wilhelm, was that the Madonna in the latter is pressed closer under the niche, and the Burgermeister's family closer to the Madonna. It was later that minuter differences were detected; in fact all came to light for the first time when the two paintings were exhibited side by side in Dresden in 1871. Then it was seen that the Darmstadt picture is fuller of warmth and life. The well-known critic Kugler, had pointed out that the shadows in the Dresden Madonna's neck are not of the carnation tone which Holbein loved; now others saw that the parted lips of the elder son are wooden, that the gold crown of the Virgin and the hair of all the personages are thinly laid on, that the black lines of the embroidery on the white dress of the young girl are unevenly drawn, and the carpet roughly drawn in comparison with the Darmstadt picture, and that the whole coloring is more insipid. The English authority, Wornum, of the National Gallery, declared once for all that in his judgment Holbein had never laid a hand on the Dresden picture; and Woltman, the most learned Holbein connoisseur in Europe, wrote with fervor to similar effect.

Among the sketches of Holbein studied by Woltman, there exist studies for this picture of the Meyer Madonna. In these the heads of both women are wrapped about with a cloth, according to a fashion of the times and a custom still existing in some parts of Germany; and the daughter Anna has floating hair. On both pictures, her hair is in a net, and only the head of the dead first wife is bound in a chin-cloth. The Darmstadt painting won powerful support when it was found that under the outer layer of paint there are perceptible earlier lines representing floating hair.

But in spite of these proofs and others, habit has been a heavy weight on the side of the Dresden picture. It was the old, well-known one; too many had praised it to give over without further ado. Besides there were certain unanswerable points, as that of the insipid smile of the Darmstadt Madonna, which was so wholly unlike Holbein.

What is the excitement now and earnestness when the Darmstadt painting has been cleaned, to discover that it was not merely covered with a thick, disadvantageous varnish, but that whole portions had been painted over — more portions than any critic has claimed. Hauser removed the overlays of paint, as well as the varnish: not the layer over the floating hair of the girl and the chin-cloth of the wife of Meyer; these are solid impasto, equal in age with the rest of the painting; but the superficial layers. It comes to light that the Madonna's nose had been made straight by these, her original indescribable expression of mildness and majesty disfigured by a smile drawn in her cheeks, and the profile nose of the daughter Anna made straight and shorter. The last points, in short, that told against the picture, have fallen away; it is granted to be the original, and its worth has risen from twenty thousand to a million thalers.

COUNTESS VON KROCKAU.

AN ANCIENT MEXICAN CANAL UNCOVERED. — The Riverside (Cal.) *Press* reports H. J. Stephenson, surveyor of the Palm Valley Water Company, as making a singular discovery while surveying the canal line running south and easterly from the old Agua Caliente Springs. "He had run one line on a grade of four feet to the mile from the present terminus of the stone canal to the new town site, but in crossing a depression near the mountain it would become necessary to build a quarter of a mile of fluming. In order to obviate this expense, he was instructed to make a new survey on a grade of eight feet to the mile, so as to strike the town site at a lower level and cross the depression without a flume. On this last survey, after crossing the depression in good shape, he struck an old canal that must have been used centuries ago, for large trees had grown up in the very bottom of the canal, and the indications were that when used it carried a very large volume of water. The most singular thing about the canal was that the surveyors found it just where they wanted to construct the new canal, and, in following it up for a distance of about a mile, it was found to have a regular grade of about eight feet to the mile."

FOURTH ANNUAL REPORT OF THE BUREAU OF ETHNOLOGY.[1] — II.

STUDIES IN POTTERY, BY WILLIAM H. HOLMES.

Fig. 303.

MR. WM. H. HOLMES, who contributes three important studies in pottery, is the artist in charge of the illustrations for the publications of the Bureau of Ethnology, and is honorary curator of the pottery collections in the National Museum. He has thus had excellent opportunities for the study of ceramics and, moreover, unites with high artistic talent a mind well trained in careful scientific observation. The first of his three papers relates to the more ancient groups of Pueblo pottery in the National Museum collections, considered under the heads of coiled, plain and painted wares. As Major Powell remarks editorially, "He has used the information in his possession to elucidate the processes by which culture has been achieved and the stages through which it has passed. It is to be noted, however, that the Pueblos were sedentary and thus practised ceramic art continuously for a long period; also that in their arid country there was special need of vessels for the transportation and the storage of water." Major Powell justly points out that in the illustrations some designs will attract attention from their resemblance to the most exquisite patterns of Classic art and Oriental decoration, with which they will bear favorable comparison. "The special feature of this paper is that it explains more fully than has been explained before, with practical examples, the development of geometric ornamentation. It is shown that forms of decoration, originating in the previously existing textile art and hence purely conventional, were imposed upon the potter's art, which, at the time of the Spanish conquest had not yet acquired a style purely its own."

Among the copious and beautiful illustrations, to show Mr. Holmes's method of study, we may select four examples drawn from one specimen, a dipper from the ancient province of Tusayan in northeastern Arizona. These give a good idea of the nature of the methods of design among the ancient Pueblos. First, in Figure 302, we have the engraving of a dipper reduced to one-third the size of the original. The handle is plain and terminates in a horizontal loop. The painted design is not arranged about a square, but leaves a space in the centre of the bowl resembling a four-cornered star. "This shape is, however, the result of accident. The four parts are units of an elaborate border, not severed from their original connection, but contorted, from crowding into the circular space. The design drawn

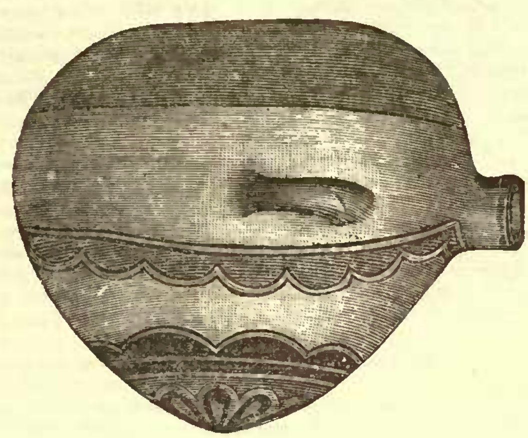
Fig. 310.

upon a plain surface is shown in Figure 303. Projected in a straight line, as in Figure 304, it is readily recognized as the lower three-fourths of a zone of scroll ornamentation. A unit of the design drawn in black is shown in Figure 305. The meander is developed in the white color of the ground, and consists of two charmingly varied threads running side by side through a field of black, bordered by heavy black lines. The involute ends of the units are connected by two minute auxiliary scrolls."

Another beautiful example is that of the vessel from the same province presented in a reduction of one-half in Figure 310. It has a flattened upper surface, an angular shoulder and a high body, slightly conical below. "The painted design is nearly obliterated in places by abrasion or weathering, but is correctly presented in Figure 311, which gives the three zones in horizontal projection. This brings out a very marked feature, the cruciform arrangement

[1] Continued from No. 629, page 21.

of the parts, which would not be apparent in a vertical projection. The two inner circles occupy the upper surface of the vessel and the outer one the most expanded portion of the body. The inner belt is separated into four panels or compartments by as many series of



transverse lines, the panels being filled in with longitudinal broken lines. The second band is also divided by four series of straight lines, but the compartments are occupied by scrolls in white, bordered by serrate wings in black. The outer band exhibits a very curious combination of features, the whole figure, however, being based upon the meander. It is probable that the grouping in fours is accidental, the division of a surface into four being much more readily accomplished than into any other number above two."

In this conjecture about the reason for the grouping in fours, Mr. Holmes is probably mistaken, since four is a number of peculiarly-sacred significance among the Indians. They use it in the same way that we, in our Aryan race, are habituated to use the nu..ber three, as, for instance, where in starting in upon a physical contest of any kind we would naturally exclaim: "One, two, three, go!" an Indian would invariably say: "One, two, three, four, go!" In formal preliminary repetitions, also, as in relating a folk-tale, they repeat four times, as we are accustomed to three. The reasons for these adoptions of different numbers would probably have to be sought far back in the early days of the respective races.

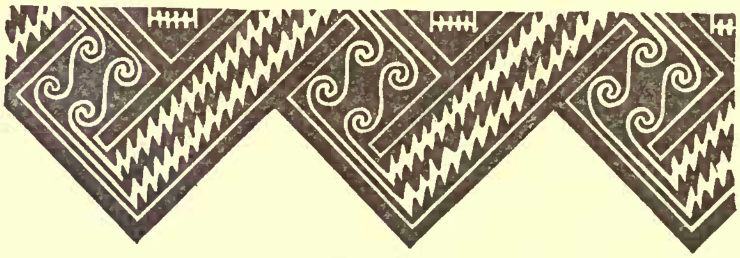


Fig. 304.

In conclusion, Mr. Holmes has a word to say about the origin and character of the leading decorative conceptions: "Glancing through the series of vases illustrated under painted ware, we find that ninety-four out of one hundred designs are meanders or are based upon the meander. Beginning with the simple waved or broken line, we pass up through all grades of increasing complexity to chains of curvilinear and rectilinear meanders, in which the links are highly individualized, being composed of a signoid line terminating in reverse hooks, but in no single case do we reach a loop in the curved forms or an intersection in the angular forms. The typical intersecting Greek fret does not therefore occur, nor, I may add, is it found anywhere in native American art. The constructional character of the art in which these linear forms developed, although they encouraged geometrical elaboration, forbade intersections or crossing of a line upon itself, and the genius of the decorator had never freed itself from this bondage. The forms imposed upon decoration by the textile art are necessarily geometric and rectilinear, and their employment in other less conventional arts has been too limited to destroy or even greatly modify these characters. The study of Pueblo art embodied in the preceding pages tells the simple story of the evolution of art — and especially of decorative art — in a period when the expanding mind of primitive man, still held in the firm grasp of instinctive and traditional methods — the bonds of Nature — was steadily working out its æsthetic destiny."

Mr. Holmes's second paper, upon the ancient pottery of the Mississippi Valley, is an important contribution to that branch of the general subject under discussion, but for the present we must content ourselves with a quotation from Major Powell's editorial remarks and pass on to a consideration of the paper on the origin and development of form in ceramic art. Says Major Powell: "A prominent feature is the great diversity of form, indicating the long practice of the art, a high specialization of uses and considerable variety in the originals copied. The manual skill was of a fair order, and symmetry of form, combined with grace of outline, was achieved without the use of the wheel. The rank of this ware is higher in these respects than that of the historic pottery of Central and Northern Europe, though inferior to that of Mexico, Central America and Peru. In characterizing the degree of culture represented by this ware, Mr. Holmes decides that there is no feature in it that cannot reasonably be attributed to the more advanced historic tribes of the valley where it is found. It indicates a culture differing in many particulars from that of the Pueblo Indians, ancient or modern, but, on the whole, is rather inferior to it."

Mr. Holmes's third paper is brief, but highly suggestive. We cannot do better than reproduce Major Powell's characterization: "The prominent feature of the present paper, which combines the results of the three former papers, the first of which, "Prehistoric Textile Fabrics of the United States derived from Impressions on Pottery," appeared in the Third Annual Report, is that it presents the evolution of form and ornament in the ceramic art and suggests the same evolution in all other developments of art. The course of development here, as elsewhere, is shown to proceed from the simple to the complex, and the causes and processes of the developments are explained, analyzed, classified and illustrated from examples never before presented. The accessible material on the subject shows that in America there is opportunity for the study of the origin of art beyond any hitherto enjoyed in the Eastern Hemisphere. In the order of evolution, the character of the specimens now under examination ends where Classic art begins, and though the recent discoveries by Schliemann and others have brought to notice the lower archæological substratum of the East, its productions are few and meager compared with the multitudes of representative objects of the same general character already in the National Museum. These now open to the student the advantage of a method which examines into the beginnings of art in reference to form and ornamentation, as well as into the earliest traces of manufacture or construction and of function, which show a widely different evolutionary line."

The foregoing remarks are to be commended to the attention of those devotees of Classic archæology who can see nothing in the American field worthy of æsthetic consideration. They must be blind indeed if they cannot now perceive the important bearing which studies on American ground have upon a correct understanding of the results of the explorations conducted upon the historic soil of the Old World.

In the present paper, Mr. Holmes confines himself to the geometric side of the study. The important results already obtained cause us to give a doubly hearty welcome to the announcement that he is preparing a monograph on a comprehensive basis. Major Powell deduces the important general observation from the subject, as now presented, that no metaphysical law of beauty is to be ascertained: "The æsthetic principle is not to be found directly in or from Nature, but is an artificial accretion of long-descended imitations of objective phenomena. Objects are not made because they are essentially pleasing, but are actually pleasing because they have been customarily made. The primitive artist does not deliberately examine the departments of Nature and art and select for models those things which are most agreeable to an independent fancy, nor even those which simple reason would decide upon as most convenient. Neither does he experiment with any distinct purpose to invent new forms. What he attempts in improvement is what happens to be suggested by some preceding form familiar to him. Each step is not only limited, but prescribed by what he already possesses in nature or in art, and, knowing his resources, his results can be closely predicted. On the other hand, knowing his products, much can safely be predicated of his environment and past stages of development."

Major Powell shows a fine discernment in these words. Many a thoughtful student of æsthetic principles has reached certain conclu-

sions in this regard. Habit has a powerful influence in the formation of a standard of what is commonly called the beautiful, and that this standard varies according to conditions of time and place

is shown by manifold observations. The power of one of the most fickle influences of our modern life, the influence of "fashion," strongly reinforces the remark that objects are pleasing because they are customarily made. Forms of personal ornament which, should they appear suddenly upon the street, would be received with derision and would often be sufficient to raise a mob because of their unwontedness, become by usage in a very short time endowed with the equivalent of beauty in the eyes of the multitude. But here a distinction should be drawn between the pleasing and the beautiful. To the truly artistic eye the cylinder hat, the big bustle and the like will ever remain hideous objects, however familiar custom may make them. To the multitude, however, with the æsthetic faculty undeveloped, the unwonted is displeasing. This may be seen in the matter of what we call learning to like certain articles of food, when through a desire to conform to the habits of our fellows, we force ourselves to find pleasure in what was originally repulsive to us. And how disgusting a certain viand is made if we unexpectedly find it imbued with the flavor of some other viand, no matter how pleasing the latter may be to us in itself. Is not this principle at the base of what we call "a cultivated taste," even in the broadest sense of the term? And may not even pain arise from the misapplication of the same sensation that produces pleasure?

While there may be no absolute standard of beauty, it seems as though there might be an intrinsically existing beauty quite apart from what is ordinarily pleasing. With persons in whom the feeling for true beauty resides the faculty appears to be intuitive, and quite independent of custom or fashion; based on those divine laws of proportion, affecting the perceptions in harmoniously adjusted relations, and making music, in the Classic and highest meaning of the word, for whatever sense to which the producing cause may be addressed. And these relations, must of necessity have a strictly mathematical origin, causing pleasurable sensations by series of vibrations rythmically affecting the nerves of perception. This must be the action of that rule of "the Golden Cut," which is said to lie at the base of structural beauty, and the existence of which enables us, for instance, without knowing exactly why, to tell whether architectural work is well designed, or no.

The advantages of the American field of archæological research in comparison with the favorite fields of the Old World are shown by Mr. Holmes's remark that the dawn of art in those countries lies hidden in the shadow of unnumbered ages, while ours stand out in the light of the very present. "This is well illustrated by a remark of Birch, who in dwelling upon the antiquity of the fictile art, says that 'the existence of earthen vessels in Egypt was at least coeval with the formation of a written language.' Beyond this there is acknowledged chaos. In strong contrast with this is the fact that all pre-Columbian American pottery *precedes* the acquisition of written language, and this contrast is emphasized by the additional fact that it antedates the use of the wheel, that great perverter of the plastic tendencies of clay."

Mr. Holmes finds in ceramic art two classes of phenomena of importance in the study of the evolution of æsthetic culture, relating, first to form and second to ornament. No form, or class of forms, he maintains, can be said to characterize a particular age or stage of culture, though, in a general way, of course, the vessels of primitive people will be simple in form, while those of more advanced races will be more varied and highly specialized. The shapes first assumed depend upon the shape of the vessels employed at the time of the introduction of the art and upon the resources of the country in which they live. This is illustrated as follows: "If, for instance, some of the highly advanced Alaskan tribes which do not make pottery should migrate to another habitat, less suitable to the practice of their old arts and well adapted to art in clay, and should there acquire the art of pottery, they would doubtless, to a great extent, copy their highly developed utensils of wood, bone, ivory and basketry, and thus reach a high grade of ceramic achievement in the first century of the practice of the art; but, on the other hand, if certain tribes, very low in intelligence and having no vessel-making arts, should undergo a corresponding change of habitat and acquire the art of pottery, they might not reach in a thousand years, if left to themselves, a grade in the art equal to that of the hypothetical Alaskan potters in the first decade. It is, therefore, not the age of the art itself that determines its form, but the grade and kind of the art with which it originates and co-exists."

Ornament is found to be subject to similar laws. "Where pottery is employed by peoples in very low stages of culture, its ornamentation will be of a simple archaic kind. Being a conservative art and much hampered by the restraints of convention, the elementary forms of ornament are carried a long way into the succeeding periods and have a very decided effect upon the higher stages. Pottery brought into use for the first time by more advanced races will never pass through the elementary stage of decoration, but will take its ornament greatly from existing art and carry this up in its own peculiar way through succeeding generations."

The author considers the possible origin of form as by adventition, by imitation of natural and artificial models, and by invention. He finds a key to unlock many of the mysteries of form in the observation that clay is so mobile as to be quite free to take form from surroundings, and where extensively used will record or echo a vast deal of Nature and of co-existent art. A number of most convincing illustrations are given to show the derivation of pottery forms from various sources, as from vessels of stone, bark, wood and basketry. In Figure 465, for instance, we have a form derived from a natural object, the vessel of clay being a palpable imitation of the conch-shell. A remarkable example of coincident forms is to be seen in Figure 473, showing how the contact of a nation of potters with a nation of carvers-in-wood would tend very decidedly to modify the utensils of the former. Here we have first, in *a*, an Alaskan vessel carved in wood. "It represents a beaver grasping a stick in its hands and teeth. The conception is so unusual and the style of vessel so characteristic of the people that we should not expect to find it repeated in other regions; but the ancient graves of the Middle Mississippi Valley have furnished a number of very similar vessels in clay, one of which is outlined in *b*. While this remarkable coincidence is suggestive of ethnic relationships which do not call for attention here, it serves to illustrate the possibilities of modification by simple contact."

Mr. Holmes's consideration of the origin of ornament, as of that of form, are of extreme interest and suggestiveness for nearly all fields of depictive art. In the study of the evolution of ornament this important fact, concisely stated by the author, should be borne constantly in mind: "Elements of design are not invented outright: man modifies, combines and recombines elements or ideas already in existence, but does not create."

One of the most fruitful sources of pottery ornamentation are the suggestions afforded by constructional features of artificial utensils or objects whose forms serve as models. We may quote our author's remarks on the influence of basketry: "Of the various classes of utensils associated closely with the ceramic art, there are none so characteristically marked by constructional features as nets and wicker-baskets. The twisting, interlacing, knotting and stitching of filaments give relieved figures that by contact in manufacture impress themselves upon the plastic clay. Such impressions come in time to be regarded as pleasing features, and when free-hand methods of reproducing are finally acquired, they and their derivatives become essentials of decoration. At a later stage these characters of basketry influence ceramic decoration in a somewhat different way. By the use of variously-colored fillets the woven surface displays figures in color corresponding to those in relief, and varying with every new combination. Many striking patterns are thus produced, and the potter who has learned to decorate his wares by the stylus or brush reproduces these patterns by free-hand methods. We find pottery in all countries ornamented with patterns, painted, incised, stamped and relieved, certainly derived from this source."

In considering the development of fret-work and scroll-work, Mr. Holmes takes issue with the late Professor C. F. Hartt's theory, that the development of ornamental designs took particular and uniform directions owing to the structure of the eye, certain forms being chosen and perpetuated because of the pleasure afforded by movements of the eye in following them, and that, in unison with the general course of Nature decorative forms began with simple elements and developed by systematic methods to complex forms. "Let us turn to the primitive artisan," says Mr. Holmes, "and observe him at work with rude brush and stylus upon the rounded and irregular forms of his utensils and weapons, or upon skins, barks and rock-surfaces. Is it probable that with his free-hand directed by the eye alone he will be able to achieve these rythmic geometric forms? It seems to me that the whole tendency is in the opposite direction. I venture to surmise that if there had been no other resources than those named above, the typical rectilinear fret would never have been known, at least to the primitive world; for, notwithstanding the contrary statement by Professor Hartt, the fret is, in its more highly developed forms, extremely difficult to follow with the eye and to delineate with the hand. Until arts, geometric in their construction, arose to create and combine mechanically the necessary elements and motives, and lead the way by a long series of object lessons to ideas of geometric combination, our typical border ornament would not be possible. Such arts are the textile arts and architecture. These brought into existence forms and ideas not met with in Nature and not primarily thought of by man, and combined them in defiance of human conceptions of grace. Geometric ornament is the offspring of technique." SYLVESTER BAXTER.

BOOKS AND PAPERS.

JACQUES ANDROUET DU CERCEAU[1] is a name which we fancy is not very familiar to the majority of our readers, though any one who has had an intimate acquaintance with a French atelier will recall the name in connection with a volume entitled "*Les Plus Excellents Bâtiments de France*," a work which is not only classical in French architectural history, but is also invaluable for the insight it gives into the architecture of the transitional period in French art. Du Cerceau might be called the apostle or almost the creator of the *style Henri II*. The exact date of his birth is so shrouded in conjecture that we can only assume that he was born some time before 1520. He visited Italy in 1531 as we know by some sketches of his which bear that date, and which seem to indicate that he was a stranger to Italian art up to that time. Du Cerceau was the first Frenchman, we believe, who went to Rome to study architecture, instead of going

[1] "*Les Du Cerceau, leur vie et leur œuvre, d'après de nouvelles recherches*," par le Baron Henri de Geymüller. Paris: J. Rouam, Editeur.

to Milan or the northern Italian cities, after the manner of Jean de Bullant, Philbert de l'Orme and others who preceded him by a number of years. In Du Cerceau's time the Renaissance was just beginning to show itself. The influence of François I and his artists made the people somewhat acquainted with the nature of the movement which was taking place in Italy; but Du Cerceau can almost be credited with being tbe real founder of the French Renaissance. Certainly he did a great deal to give the new style a pure direction, as is seen by his numerous publications, and to popularize a taste for Italian ideas in art. His stay in Italy was not very extended as nearly as we can discover, but he was very much impressed by the works of Bramante and his school, and the creations of the Henri II period show how much he sought to follow in the steps of the illustrious architect of Saint Peter's. Those who are familiar with the Paris churches will remember that Saint Eustache was begun about the same time as Saint Peter's at Rome, and the construction of the two churches was carried on simultaneously. Du Cerceau prepared a very interesting scheme for the façade of Saint Eustache, and we believe it was partly carried out in the lower stories, though subsequently changed in the upper portions. By the sketches which he has left of his idea, it would appear that he aimed to produce a front after the style of the Palazzo Farnese Court-yard — a bold, severe Doric. We can easily imagine how Du Cerceau, fresh from the influence of Bramante, should endeavor to engraft the Italian ideas on the semi-Gothic stock. Still, one cannot altogether regret that Saint Eustache is no more pure than it is, for the mixture which now exists is thoroughly pleasing and picturesque.

Du Cerceau's actual work as an architect appears to have been very limited. Aside from the church and château at Montarges, we have no absolute record of his work, though judging from his notes it is reasonably certain that he was at least associated in the construction of the Château de Madrid and the Château de Verneuil; while among his drawings are several *projets* for portions of the Louvre, though it is doubtful if any of his designs for the Royal Palace were actually carried out. His general title to fame lies in his publications. Almost immediately upon his return from Italy, he became inspired with the desire to popularize throughout France a knowledge of Italian architecture in order to put his country in a condition to compete with Italy and the Italian artists, at that time, so numerous in France. He says himself of his works that they had for aim to "*servir à ceux qui sont curieux de l'antiquité, et encore plus (à mon jugement) à ceux qui sont maistres en l'architecture, lesquels y pourront trouver plusieurs beaux traits et enrichessements pour aider leurs inventions.*"

With these aims in view, he published during his lifetime so extended a series of works that it seems almost as if much that was attributed to him must have been the work of some other architect of the time, though his biographer submits very substantial evidence of the authenticity of all the works that are attributed to Du Cerceau. His volumes can be divided into three categories: first, works for painters or draughtsmen, in which the human figure plays the principal rôle; secondly, works relating to decorative art; and third, works devoted entirely to architecture. There are many things in the second group which are architecturally interesting, but the most valuable of his productions are comprised in the last category. Du Cerceau published successively books on "*Architectural Ruins*," including all the Roman antiquities which have since been studied so exhaustively by the French students; also a book on the "*Orders*;" another on "*Triumphal Arches*;" another on "*Fountains and Gateways*;" and an exceedingly valuable volume of architectural details, all of them purely Classical and taken directly from the old work. The work on the "*Grands Cartouches de Fontainebleau*" is also ascribed, with reason, to him. Besides these works, which have all to do more or less with Classical architecture as distinguished from the Renaissance, he published three large volumes dealing with "*Religious Monuments, Temples and Fortified Habitations*," which include the Renaissance work to a certain extent. But his best known work, the most valuable, both for itself as a document and for its relation to history, is "*The Most Excellent Buildings of France*," a collection of the best châteaux and palaces of the period, including many which have since entirely disappeared, and also including schemes and *projets* which were never carried out. The drawings were all made by Du Cerceau himself or by one of his sons, and are simply invaluable to any one who cares to study the French Renaissance. The work is almost too well known to need any mention.

Of Du Cerceau's manner as a draughtsman, M. de Geymüller gives us some details which would probably interest a student. Du Cerceau was obliged to work very rapidly in order to accomplish all that he did, for he engraved all of his drawings, besides making innumerable sketches which are scattered through the European collections, and especially in some of his later works we find him adapting many little tricks to expedite his drawing. For instance, when he drew columns in perspective, the ellipses of the capitals and bases were often replaced by arcs of circles, of which the centres were placed on the axes of the columns. In one very clever drawing of his series of "*Orders*," a column is shown surrounded with spiral flutings, each one of which is traced with two arcs of a circle, and sometimes he even replaced perspective ellipses by segments of circles. Of course, such processes did not add to the value of his work, still Du Cerceau was so immeasureably ahead of any draughtsman of his age, that we can easily see how he could have adopted such devices with a clear conscience. We remember being very much struck a number of years ago with the contrast afforded in an exhibition, where the original drawings of Michael Angelo, Bramante and Raphael for Saint Peter's at Rome were displayed together with very clever architectural sketches by some modern French draughtsmen. The contrast was the more striking in that the ideas in the first case were so good, and in the second so poor; while the execution of the old masters was almost ridiculous as to technique, and the sketches of their modern descendants were absolutely perfect. The same contrast is suggested by a perusal of Du Cerceau's works, and one cannot but question whether what we have gained in technique has not implied a loss in ideas. Du Cerceau's personal sketches are scrawly, ill-drawn and misshapen, but the ideas are there every time, and the sketch means something; each line shows that the artist thought a great deal more than he drew. It is exactly this quality which makes Du Cerceau's work so valuable. Much of it is, of course, foreign to the present needs, but through it all we can see the imprint of serious thought; and it may be well questioned whether a return to some of the feeble methods of drawing might not be for the good of our architectural students of to-day, provided it could be combined with a corresponding return of freshness of ideas.

Du Cerceau was one who influenced more than he created, in which respect he may well be compared to his modern successor, Viollet-le-Duc. Du Cerceau certainly exerted an enormous influence on his contemporaries, and moulded the art-thought of his time into the lines, which in later years developed with such strength of architectural thought. It is interesting to know that Du Cerceau, in common with his illustrious co-worker, Jean Goujon, was a Protestant, but more fortunate than the sculptor he escaped the Saint Bartholemew massacre, and was even protected by Catherine de Medici, to whom he dedicated some of his works.

M. de Geymüller in this biography has accomplished, what no one but a Frenchman could have done, giving us the details of his life, character, works, surroundings and influences down to the very last supposition, even taking up his heirs and descendants to the tenth generation. The work is prolix in the extreme, and were it not for the admirable illustrations to the number of 128, that are scattered through the volume, it would be such as no one but a book-worm would ever care to seek for. The pictures tell the story just as Du Cerceau's own publications gave the key to his life.

SOCIETIES

NEW YORK CHAPTER OF AMERICAN INSTITUTE OF ARCHITECTS.

AT a regular meeting of the New York Chapter of the A. I. A., held January 11, the following officers were unanimously elected:

President, E. H. Kendall; Vice-Presidents, Geo. B. Post, C. W. Clinton; Secretary and Treasurer, A. J. Bloor. Standing Committees (the President and Secretary being *ex-officio* members of each): Executive, N. Le Brun, F. A. Wright; Library and Publication, Jas. E. Ware, Theo. de Lemos, H. O. Avery; Examinations, N. Le Brun, R. M. Upjohn, R. M. Hunt.

The following reports were submitted and accepted:

To the N. Y. Chapter, A. I. A.:

. . . .

Mr. Le Brun, the chairman of your committee on examinations, and *ipso facto* the representative of the Chapter in the Board of Examiners of the Building Bureau of the New York Fire-Department, was, with his colleagues of the board, invited by the commissioners of that branch of the municipal government to unite with them in joint committee for the purpose of suggesting amendments to the New York building-law with a view to perfecting the same and presenting it to the Legislature for enactment. The invitation was accepted, and on the organization of the joint committee the chairman of your committee on examinations was elected its chairman and the Hon. Elward Smith its secretary. This joint action resulted in the presentation of two reports, one in the interest of good building and the retention of the influence of the Chapter toward that end, the other more in the interest of speculative builders and calculated to minimize the professional and ameliorative influence of the Chapter. The better influence prevailed, however, and the building-law, though still not everything that is to be desired, received distinct improvements. To those familiar with the history of the building interests of New York under the municipal government, the gradual and of late marked improvements in the methods and *personelle* of that branch of it having those interests in charge, is very apparent. Your committee on examinations, during the twenty years of its existence, has, it may be conceded, fairly earned some portion of the credit for extending the growth of a faithful professional animus in this branch of the city government, contrasting strongly with the old-time prevalent spirit of mere self-seeking political placemen, frequently incompetent — at least in the lower grades of service — to the proper performance of the duties attached to positions in public employ, and bringing undeserved discredit on competent and conscientious fellow employés.

And in view of the immense importance of the interests in question, involving, as they do in large measure, the æsthetical environments, the sanitary conditions and the comfort and safety of the homes and the public places of worship, of justice, of business, and of recreation of two millions of people, at an enormous annual expenditure — nearly seventy millions of dollars having been spent during the past year in building operations within the city limits — this improvement is something on which the public, as well as the municipality, may well be congratulated.

Respectfully submitted,

N. LE BRUN,
A. J. BLOOR,
R. M. UPJOHN.

Welles Building, 18 *Broadway, N. Y.*, *January* 11, 1888.

To the N. Y. Chapter, A. I. A.:

Your Executive Committee for the year 1886–87, as soon as it entered office, found itself confronted by the financial problem of how the Chapter should find the means to entertain the Twentieth Annual Convention of the Institute, which was due in this city on December 1 and 2, 1886. For many years, when a convention of the Institute has met in centres where a chapter exists, its members have been treated as the guests of that chapter, and it was now the turn of our chapter to reciprocate the hospitalities of many occasions. But the small revenue derivable from the dues of its members is necessarily absorbed in current expenses. The matter was finally referred to the committee of arrangements appointed by the Board of Trustees of the Institute, namely, Messrs. Littell and Hatfield, and the president and secretary; and after much painstaking on their part, and the issue of several circular letters, the handsome sum of seven hundred and twenty-one dollars was received from the members of the chapter and from four members of the Institute not members of the chapter. This amount enabled us to give our guests the handsome entertainment at which most of you assisted, and left a small balance over.

. . . .

Your committee desire to call your attention to the fact that at the twentieth convention of the Institute the special committee appointed to review the reports of the various chapters called the attention of the Institute to the statement that some of the chapters attributed their current success to the fact that their meetings were carried through on social lines, the business being preceded by a dinner, after the labors of the day were ended; and the special committee expressed it as their opinion that if this system were followed by other chapters it would have a good effect. The older members of the chapter will remember that these lines were partially followed by it for a number of years, the midday meetings being preceded by a light lunch. The result was, on the whole, tolerably successful, but a moiety of the members was in favor of evening meetings, and the custom fell into desuetude. It is a question whether it might not be revived with good effect in the shape of dinners after the professional labors of the day and preceding the chapter business. But here again the financial element comes in. Your committee, however, think that the subject might well be made the question of a succeeding meeting.

Respectfully submitted,

EDWARD H. KENDALL,
RICHARD M. UPJOHN,
N. LE BRUN,
A J BLOOR.

Welles Building, 18 *Broadway, N. Y.*, *January* 11, 1888.

To the N. Y. Chapter, A. I. A.:

Your Committee on Library and publications for the year 1886–87 have only to report that the books and photographs of the chapter library have received during the year perhaps somewhat less than the average share of inspection and use from members and students. The most notable instance of the employment of the photographs was the borrowing by the Architectural League of New York of twenty-five examples from the Gambrill collection for use in the League's highly creditable exhibition in the Kurz Art Galleries, followed since by their very recent and even more admirable one in the Ortgies Art Galleries.

There is a law of the chapter that none of its contents shall be allowed to be taken from its library and reading-room, and this regulation, notwithstanding being frequently urged to overlook it, your secretary and librarian has always rigidly respected. But on this occasion he thought he would not only best meet the desires of the lamented collector and munificent donor of the Gambrill collection, but also best subserve the beneficent purposes of the chapter by temporarily giving up the custody of these illustrations to Messrs. Wright & Avery, who are members alike of the Chapter and of the League. It is hardly necessary to add that the photographs were all returned duly and in good condition.

Respectfully submitted,

E. H. KENDALL,
H. H. HOLLY,
JAS. E. WARE,
THEO. DE LEMOS,
A. J. BLOOR,

Welles Building, 18 *Broadway, N. Y.*, *January* 11, 1888.

COMMUNICATIONS

WHO MAKES IRON CHURCHES?

PHILADELPHIA, PA., January 20, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — Can you or any of your readers give the names of parties who construct iron churches in the United States? In England such buildings for use not only in that country but in warmer climates are made upon designs prepared by church architects, and their use presents obvious advantages where temporary buildings are desired for missions, or where parishes are not strong enough to erect permanent buildings, or where shifting population may require future removal. In many if not all large cities, wooden buildings are not allowed, and if iron churches can be furnished at a reasonable cost, a great want would be supplied. M.

THE DECORATIONS OF McVICKER'S THEATRE, CHICAGO.

CHICAGO, ILL., January 18, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — Will you kindly give space to a correction of Mr. C. H. Blackall's paper, "Notes of Travel," which appeared in your issue of December 24th, erroneously giving credit to Messrs. Adler & Sullivan for the decoration of McVicker's theatre. The work was executed under my charge and dictation and was my own conception without control of architect or owner. Yours faithfully,

JOSEPH TWYMAN.

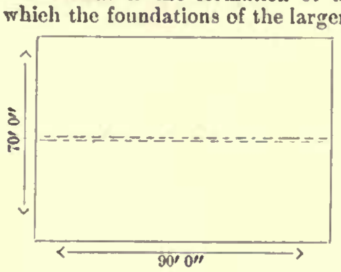
THE BEARING CAPACITY OF NEW YORK SUBSOIL.

CHICAGO, ILL., January 10, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — Would be pleased to get information on the following questions:

1. What is the formation of the subsoil of New York City on which the foundations of the larger and heavier buildings are placed, and what is the bearing capacity per square foot of this subsoil as accepted by architects.



2. Which is the best method of constructing the floor of a dance-hall so as to practically deafen noise as much as possible and also to avoid the vibration of ceiling below to prevent cracking of plaster, etc. Hall is 70' x 90', and has only one line of supports through centre below. Would it not be advisable to make ceiling joists of apartments below independent of floor joists?

By answering the above question you will confer favor on a

CHICAGO SUBSCRIBER.

[1. The lower portion of New York City stands mostly on gravel, varying in resistance from the hard central ridge, along which Broadway runs, to the river-banks, where it is mixed with mud and is quite soft. From Madison Square northward to Harlem, the subsoil is mostly gneiss rock, capable of bearing almost any weight, and at the northern extremity of the island limestone appears. So far as we know, there is no rule accepted by architects for the bearing capacity of the soil in the lower part of the city, which is the only portion in which it usually needs to be considered. On and near Broadway five tons to the square foot would not be too much, but east or west of this line the resistance varies greatly, and it is common before designing foundations to consult the records of the Department of Buildings, where very valuable notes of the character of the subsoil in various parts of the city are kept and explained to architects with the utmost courtesy.

2. As suggested, the only efficient way of deafening the floor of such a dance-hall is to use ceiling-joists entirely independent of the floor-beams.— EDS. AMERICAN ARCHITECT.]

NOTES AND CLIPPINGS

A STATUE OF BUDDHA AT NARA, JAPAN. — This town of Nara, Japan, was once a great city. Where to-day in the Valley the rice fields spread their carpets of verdure there once were long streets lined with houses and the palaces of princes. To-day there are but 21,000 inhabitants in the place. Once there were nearly a quarter of a million. Nara was the capital of Japan from 709 to 784 A. D. It was a great city when London was in its infancy, Paris a mere village and Berlin a wind-swept waste. The site of the Mikado's palace is now a broad field of growing grain three miles to the west of the present town. The temples and shrines of that olden time are nearly all gone, having been burnt, or having fallen down and been consumed by the elements. A few only of the works of the past remain to attest the fact that the civilization of Japan in the eighth century in many respects was equal to that of the nineteenth century. Among these monuments of by-gone days the most famous is the great image of Buddha. This stands in an ungainly building, the roof of which is seen peering above the trees on the mountain-side. This building is quite modern, having been erected about the beginning of the last century as a protection to the huge idol. It is surrounded by a broad garden, which is enclosed

by a gallery built of wood and white plaster, the upright beams being painted red. The building is said to be a feeble reproduction of the great temple originally erected by the Mikado Sho-mu Ten-no, in the year 750 A. D., but which was burned. Sho-mu Ten-no was a devout Buddhist who held the reins of power in Japan when Charlemagne was still a child. He conceived the idea of erecting an immense image in honor of Buddha but, as the story runs, was filled with fear lest the native deities of Japan should be offended. He accordingly sent a priest to the temple of the sun goddess to ascertain from her how she would regard the project. The priest, whose name was Gio-Gi, passed a week patiently waiting under an oak tree near the temple gate. Upon the morning of the eighth day the doors of the chapel were flung open and the sun goddess presented herself in person and announced that "the Sun is Biroshana" — that is, one of the persons of the Buddhist Trinity, and declared her approval of the plan of the Mikado. He accordingly announced his intention to erect an image of gold and copper one hundred and sixty feet high and in A. D. 743 ordered the people of Japan to send in their contributions and in 744 himself superintended the construction of the model. The original design of constructing a bronze figure 160 feet high was apparently abandoned, and the actual result was a figure which is only 53 feet in height. This huge bronze idol has passed through many vicissitudes during the 1138 years since it came from the hands of the founders. In 859, A. D. the Great Buddha "lost his head," which had not been properly secured. Skilled workmen succeeded at once in putting a new and stronger head upon him. In 1180, during one of the civil wars by which Japan has been from time to time convulsed, the temple covering the image was burned and the new head was melted. The image and the temple were soon both restored; but the head troubles of the old idol were not at an end yet. In 1567 the temple was again burned, and when the smoke cleared away it was discovered that once more Buddha was sitting with the molten remains of his face and cranium sticking to his arms and shoulders like tallow to a dying taper. This lamentable state of affairs led a generous private person to give a sufficient sum to repair the damage, and the workmen once more succeeded in putting a head on Buddha. Until the beginning of the last century the image was doomed to remain unprotected, and passed the time as a nurebotoke or wet god, as the Japanese say, exposed to the assaults of rain and storm and the defilement of birds. In 1710, or thereabouts, the priesthood and the laity built the present great barn-like structure. — *W. J. Holland in the Philadelphia Press.*

Who W. J. Stillman Is. — The editor of the *Century* submits to the New York *Evening Post* a letter from a New Hampshire subscriber, which reads:

"You will confer a favor on me if you will tell me who W. J. Stillman, author of the paper on John Ruskin, in the January *Century*, is, and a little something of him, or at least where I can find such general information as one likes to have of those whose papers he is reading. I have referred to everything I could think of within my reach, and still I have to leave unanswered a number of questions. "Who is W. J. Stillman?" It seems to me as if I could place the man, but when I try I fail. I enjoyed this article (John Ruskin) much — not to mention a number of others — and it has caused me to begin reading Ruskin critically, which makes me wish the more to know of Stillman."

The editor suggests that a reply to this inquiry through *The Evening Post* would outstrip his own in the magazine itself. Our readers certainly could have no difficulty in "placing" one who a few years ago was the art critic of *The Evening Post*, and is still a frequent contributor on his special subject as well as on divers others. Mr. Stillman, to begin at the end, is now the Roman correspondent of the London *Times*. He was born in Schenectady in 1828, was graduated at Union College in 1848, in the same class with the late President Arthur, and took to painting as his profession, receiving instruction in landscape from F. E. Church, N. A. In the winter of 1849-50 he went abroad for a few months, and made the acquaintance of Turner and other leading English painters, and, more intimately, of Mr. Ruskin. Up to 1852 he was painting in the Adirondack country, when his admiration for Kossuth led him to embark in a hazardous mission to Hungary, which did not succeed. On this trip Mr. Stillman studied in Paris, in the school of Yvon. In 1856, with Mr. John Durand, he founded the art journal the *Crayon* in this city, which he conducted for two years. He was abroad again in 1859, making a summer tour with Mr. Ruskin in Switzerland. In 1861 he was appointed United States Consul to Rome, and in 1865 was transferred to Crete, where he witnessed and became the historian of the last unsuccessful rising in that island. In 1869, being out of the service, he brought out a noble volume of photographs of the Acropolis at Athens, the views being taken by himself. Since that date literature rather than painting has been his vocation, but he has never ceased to pursue photography as a pastime, to which he has contributed many useful inventions and several manuals. His services as correspondent of the London *Times* enabled him to write a history of the revolt in Herzegovina that preceded the great Russo-Turkish war of 1877-78. His latest publication is "*In the Track of Ulysses*," which we have just reviewed in these columns. Mr. Stillman is familiar with all parts of the Levant, is caricatured in the press of the war party in Greece, and so hated and feared by the Turks that he is forbidden to enter the Sultan's dominions. We ought to add that a fuller account of his checkered life than we can give here is to be found in the *Photographic Times* for September 9, 1887. — *N. Y. Evening Post.*

The Lower Organisms in Cistern Water. — Mr. Gustav Bischof has extended Dr. Koch's method of estimating the number of microscopic organisms in a sample of water in such a way as to show how dangerous it may be to drink water which has been stored in a cistern for several days. Dr. Koch's method was, briefly, to mix a measured quantity of water with some sterilized gelatine spread over glass plates. After two or three days numerous spots, due to "colonies" of minute creatures, are visible to the eye, and their number is a measure of the organisms in the original water. Mr. Bischof has prolonged the duration of the test from three days to nine. He finds that the total number of colonies is thus largely increased, particularly in the case of filtered water. Thus a quarter of a teaspoonful of water, which gave 53 colonies in three days, yielded 158 colonies in nine days. A similar quantity of water, taken from the same main and stored for six days, not in an open house cistern liable to all sorts of contamination, but in properly protected vessels, yielded 3744 colonies of living creatures in the short, and no less than 115,344 in the longer period. Such facts belong to the marvels of creation, but their practical use is to show how very important it is that house cisterns should be frequently emptied, and that water should not be left to stagnate in bedroom water bottles. As *Engineering* points out, even filtration evidently allows a large number of organisms to pass which are capable of this great development.

Afghanistan Wind-mills. — A clipping from the *Milling World* says that Thomas Stevens, who recently bicycled around the world, has given the following description of peculiar wind-mills used on the frontier of Afghanistan, in Asia: High noon finds us at our destination for the day, the village of Tabbas, famous in all the country round for a peculiar wind-mill used in grinding grain. A grist mill or mills consists of a row of one-storied mud huts, each of which contains a pair of grindstones. Connecting with the upper stone is a perpendicular shaft of wood which protrudes through the wood and extends fifteen feet above it. Cross pieces run through at right angles, and plaited with rushes, transform the shaft into an upright, four-bladed affair that the wind blows round and turns the mill-stones below. So far this is only a very primitive and clumsy method of harnessing the wind, but connected with it is a very ingenious contrivance that redeems it entirely from the commonplace. A system of mud walls is built, about the same height or a little higher than the shaft, in such a manner as to concentrate and control the wind in the interest of the miller, regardless of what way the wind is blowing. The suction created by the peculiar disposition of the walls whisks the rude wattle sails around in a most lively manner. Forty of these mills are in operation at Tabbas, and to see them all in full swing, making a loud "sweshing" noise as they revolve, is a most extraordinary sight. Aside from Tabbas, these novel grist-mills are only to be seen in the territory about the Seistan Lake.

TRADE SURVEYS

The volume of business for the dead of winter has not been disappointing. Restricted mercantile operations are indicated by a return of a large amount of currency to Eastern financial centres from its Western pilgrimage. Manufacturing activity is fair in all sections. Mining operations are being conducted on the usual scale except in a large portion of the anthracite region. Shop and factory capacity is quite busily engaged on spring work. New enterprises are quite freely spoken of, some of them of very large proportions. The volume of money to all appearances will continue to increase. Foreign investments are not checked, and there is much anxiety abroad to find good speculative opportunities. Real-estate has not been handled much of late in the Western States owing to the apprehensions created over the overdone talk of restricted railroad building operations this year. For actual building requirements more than ordinary activity has been displayed among buyers and sellers of real-estate, especially in the larger cities. As to probabilities of a general advance of real-estate in manufacturing centres, the signs are not so propitious from the sellers' side. Concerning mortgage indebtedness, the snowball has been rolled until the lenders look like pigmies behind it, but every essential feature is safe. The earning capacity of the country has been greatly increased by these loans, and a volume of business has been done which would have been impossible but for its use on the scale of magnitude seen last year. Speaking specifically the industries are doing well. The paper-mills in some localities have been stopped. The electrical, hardware, textile and shoe-making interest of New England have no reason to complain. The jobbing interests have effected an immense distribution, and the jobbers who talk see no cyclones ahead. All through the New England States there is an air of contentment in the manufacturing interests. The possibilities of adverse legislation cause more scare than they will probably cause hurt. The competition of foreign goods will probably increase rather than decline, but this pressure will, no doubt, reach in the production of finer qualities of goods. It is guesswork to say what will be the outcome, but not half the evil is probable that is foretold. The building activity in New England will be greater than last year, so builders predict, because of the steadier work, steadier wages and greater accumulation of the workers who are now more than ever directing their attention to the securing of a home. Reports from nearly all our larger Maine, Massachusetts and Rhode Island mills and manufacturing establishments show that employment will be equal to the supply. There is a constant but quiet weeding out of skilled labor in these States which finds welcome in newer places at higher pay, and hence all other things being equal there is an upward tendency in wages, but not strong enough to show itself in figures except where successful strikes cause it. There will be fewer labor strikes this year, and comparatively little agitation for shorter hours. Congressional action will hardly reach the point of shutting out foreign labor, and it is a question whether artificial expedients, even if applied, would help. Building enterprise will be less subjected to interferences this season as employés intend to act, and to act conservatively in time. The iron trade is strong. Prices are close to cost. Rails are not selling freely, but some day soon the announcement will be wired over the country that orders aggregating a half million tons have been placed. Manufacturers of agricultural machines will restrict production largely this year, it has just been definitely announced, and a strong combination will be attempted before spring opens. Wood-working machinery have still a good block of business on hand, but they are watching how things are likely to go after booked orders are filled. Furniture manufacturers on account of the extraordinary house-building of the past few years have been driven, or rather tempted, to use inferior and cheaper woods, and thus meet an expanding demand for cheaper furniture by a liberal use of improved varnishes and paints. Gum, cotton-wood, cypress, sap and other woods are coming in, and yellow-pine is making a vast market for itself, and growing in the estimation of architects and builders. The furniture manufacturing interests in this way anticipate better margins this year, but the sunshine will be like an April one. The use of lumber is gaining per head of population in spite of brick, because of the much greater building activity in rural localities where wood is so generally used.

S. J. Parkhill & Co., Printers, Boston.

The American Architect and Building News, January 28, 1888. No. 631.

Copyright, 1888, by TICKNOR & Co.

HELIOTYPE PRINTING CO., BOSTON.

CHURCH OF ST. JOHN THE BAPTIST, QUEBEC, CANADA.

J. F. PEACHY, Architect.

THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. XXIII. Copyright, 1888, by TICKNOR & COMPANY, Boston, Mass. No. 632.

FEBRUARY 4, 1888.

Entered at the Post-Office at Boston as second-class matter.

CONTENTS

IN obedience to an order passed by the United States Senate January 4, a special report has been prepared upon the construction of the Congressional Library Building, which is now printed, and offers some interesting details in regard to this great public work. Although the report does not go out of its way to refer to personal matters, it seems not unlikely that the occasion for its preparation is to be sought in the outrageous attacks made in the newspapers on the integrity of the architect in regard to the tests which he applied to the cement which was furnished by the contractor for making the concrete to be used in the foundation of the building. The fact appears to have been that the specifications required that the cement should pass the ordinary tests, showing a tensile strength of three hundred pounds per square inch after one day in air and six days in water, and leaving not more than ten per cent residuum upon a sieve of twenty-five hundred meshes to the square inch. The samples furnished by one of the bidders fulfilled both these requirements, and the contract was awarded to him. On commencing the work, however, the contractor sent to the building a lot of cement of a brand not included among those which he had submitted by sample for the original test. The architect promptly rejected this, as not being in accordance with the contract, which was, of course, based upon the samples accompanying the original tender. The Commission in charge of the construction of the building, however, on being appealed to, instructed the architect to test the new cement, which had not previously been offered by any bidder, and to accept it if he found it capable of passing the tests required in the specifications. Seventy-two samples were, in pursuance of this direction, tested, only sixteen of which showed a tensile strength of three hundred pounds, as required, while most of the others were far below the standard, the lowest being seventy-eight pounds. This alone would necessitate the rejection of the cement, as being inferior to the plain and reasonable demands of the specification, but Mr. Smithmeyer found also that it was very quick-setting, and this quality, always a dangerous one in Portland cement, and particularly so in cement to be used for concrete, seemed to him, as well as to several other experts, to whom he submitted it, quite sufficient to condemn it for the purposes of the Library Building, independent of other considerations.

ON the second, and final rejection of the cement of the new brand, the contractor sent a quantity of cement of one of the brands submitted by him with his bid, and perhaps the oldest and best known in this country of all the Portland cements. The watchful architect immediately took samples from the barrels delivered, and tested them as before. Instead, however, of showing a tensile strength averaging three hundred and seven pounds to the square inch, as did the samples submitted with the bid, the samples from the barrels delivered on the work gave an average tensile strength of only two hundred and thirty-three pounds, only four specimens, out of two hundred and seventy tested by different experts, reaching the strength demanded by the contract. Moreover, some of the contractor's cement proved more quick-setting than that which had been already rejected, and an engineer officer of the army, who ought to be a good judge, wrote to the architect to say that in his opinion the cement was probably not what the brands on the barrels indicated it to be. In private work the architect, under such circumstances, would simply order the contractor to remove the whole of the cement from the ground at once, but in Washington, where an immense amount of influence can be brought to bear upon public officers, this is not so easy, and the contractor, together with those who sold him the condemned cements, appeared by counsel before the Commissioners, criticising the tests, and urging the acceptance of the cement without regard to the architect's opinion of it; while a paragraph appeared in the press despatches all over the country to the effect that the architect of the Library Building had been detected in a scheme for keeping out, by arbitrary and unreasonable tests, cements of excellent quality, in order to compel the use in the building of a particular brand, in the sale of which he had a personal interest. Fortunately, the people of the United States have found in Mr. Smithmeyer an architect who not only understands the art which he professes, but suffers neither personal influence nor cruel calumny to turn him from the path of vigilant fidelity to the trust reposed in him, and, while he makes in his part of the report no complaints or accusations in regard to any person, and assumes no airs of injured professional dignity, all architects will cordially sympathize with him in his modest suggestion that considerations of generosity toward contractors ought not to justify the relaxation of requirements indispensable to sound construction, and that for this reason, the judgment of the architect in matters within his province ought to be sustained, even if he should seem at times too strict in the construction of his specifications. In this particular case, it certainly cannot be said that a standard of three hundred pounds tensile strength after seven days is too strict, and, in view of the danger from the swelling of some quick-setting cements, the architect ought to have the privilege, which, indeed, the specification expressly reserves to him, of "subjecting the cement to such other tests as he may require," so that Mr. Smithmeyer can hardly be accused of having been too strict in his interpretation of the specification.

IN one of the tests, which was made independently for the Commissioners by General M. C. Meigs, a question of considerable technical importance was brought up. Although the cement sent to the building fell below the required tensile strength, General Meigs expressed the opinion in his report to the Commissioners that it was "quite good enough for the foundations of the Library of Congress," and stronger than any cement known to him as having been used in the foundations of any United States building in Washington, and went on to say that "these concrete foundations are to be subjected to compressive strains only," and that "the tensile strength is used in the examination of the material, because the test is easier and cheaper, and not because the concrete is expected to be pulled, exposed to tensile strains." Now, although this is unquestionably the case with concrete foundations in soil of uniform resistance, it would not be so where the concrete lay upon a subsoil of unequal consistency. We once knew a cellar-floor laid with concrete under the direction of a clever architect, in a building, the walls of which stood on piles driven through a soft-made ground to a firm stratum. If the concrete were laid on the made-ground, the settlement which was constantly going on in this would carry down the portions of the floor not attached to the walls, causing cracks and inequalities of surface, and the architect, understanding this, solved the problem by making the concrete-layer of sufficient thickness, and of materials strong enough, to form a bridge over the whole space between the walls, capable of carrying all the weight that would be likely to come upon it without any help

from the ground beneath. As in a less degree a concrete-layer on ground which is soft in places and hard in others, may serve to relieve the soft spots by bridging on them, and thus carrying off the strain to the harder places around them, it would certainly appear that a considerable transverse strength was necessary in concrete under such conditions, which, as Mr. Smithmeyer's report says, are those which unavoidably exist under the Library building. As the transverse strain on a mass imperfectly supported below, and subjected to a vertical load is composed of a compressive strain in the upper portions, and a tensile strain in the lower part, and is limited by the capacity of the material for bearing the kind of strain to which it yields most readily, it is of great importance in such cases that concrete which presents an almost unlimited resistance to compression, should have a maximum tensile strength, as on this its power of sustaining a transverse strain entirely depends, and it seems to us that Mr. Smithmeyer was therefore perfectly justified in specifying a reasonable tensile strength for the cement to be used, and that he was bound to reject cement which would have given him a concrete possessing only three-fourths of the strength which he believed necessary for giving perfect security against the strains which he considered likely to come upon it.

AS the daily papers have already widely announced, the Indiana Soldiers' and Sailors' Monument Competition has resulted in the selection of Mr. Bruno Schmitz, of Berlin, as the designer of the future monument. To laymen this is, perhaps, the most important fact, but to architects the manner in which the Commission reached its decision and the degree of regard maintained for their official promises is of equal or even greater moment. Upon these points we cannot do better than quote the words of one of the expert advisers to whom as a body the Commission has from the outset shown the most appreciative attention.

> The Commission maintained to the end the scrupulous attitude they had first assumed. After making themselves thoroughly acquainted with the seventy designs they received — two of which they threw out because the author's name appeared in the memoranda accompanying them — and making a preliminary choice of eight or ten, they awaited the comments of their Board of Experts. These in like manner presented eight or ten as most suitable for serious consideration. The Commission reported the next day that they had decided upon a shaft or column as the most desirable form of monument and had narrowed their choice, informally, to two or three. The experts then recommended, in writing, that they should, as provided in their prospectus, obtain further information before making a formal choice, by first ascertaining the names and professional prowess of the authors of these designs, and then, if necessary, asking for further drawings and explanations. The Commission accordingly broke the seals and found that the design most in favor both with themselves and with their professional advisers was by Mr. Bruno Schmitz, of Berlin. As his name is well known and his position beyond question, inasmuch as he is the bearer of many personal and professional distinctions, they at once took a decisive vote adopting his design — subject to such modifications as might be agreed upon — and sent him a letter and telegram to that effect.
>
> The report of the experts and the final action of the Commission will be sent to all the competitors as soon as they can be got through the press.
>
> Mr. Schmitz was the winner in the International Competition for the National Monument at Rome some years since. He has the Prussian and Dutch Gold Medals for art.

THE competition for designs for small school-buildings instituted by the New York State Superintendent of Schools, has resulted quite successfully, fifty-eight designs having been submitted. Of these a large portion were excluded from consideration on account of the estimated cost being greater than the sum allowed, and, apparently for this reason, no prize or honorable mention was awarded in either of the two higher classes, the best two plans for the ten-thousand dollar building being computed to cost thirteen thousand and sixteen thousand five hundred dollars respectively, while the best five-thousand dollar design was estimated to cost sixty-six hundred. No doubt the authors of these designs are a little disappointed at the result, and it is not impossible that, if estimated as their designers intended to build them, some of them might have been brought fairly within the limit, but as it was obviously impossible to call in the competitors to assist in the estimates, and the law strictly confined the jury to designs capable of being executed for the specified sum, they could hardly do more than see that the estimating was done as impartially and intelligently as possible, and this, we may be sure, they did. In the classes where premiums were awarded, Messrs. Appleyard & Bowd, of Lansing, Mich., carried off the first prize in Classes 1, 2 and 4, the second prize in each of these classes being awarded to Mr. John R. Church, of Rochester, N. Y. In Class 3, Messrs. J. C. A. Heriot & Co., of Albany, took the first prize. Special mentions in several of the classes were voted to Mr. Warren R. Briggs, of Bridgeport, Conn., a noted designer of school-houses, and to Mr. John Cox, Jr., and Mr. C. Powell Karr, of New York.

THE *Engineering and Building Record* publishes a few particulars about Mr. Lindenthal's proposed bridge across the Hudson River at New York, and gives a comparative view of the design for it and that of various other bridges of great span. The smallest of these shown is the steel arch bridge over the Mississippi River at St. Louis, not many years ago the chief engineering wonder of the country, the longest span of which is only five hundred and fifty-two feet. Next in order is the Poughkeepsie bridge across the Hudson, now in process of erection, which is a mixed girder and cantilever construction of five spans, the three widest spans being each five hundred and forty-eight feet. The third example is the suspension bridge between New York and Brooklyn, which is fifteen hundred and ninety-five feet and six inches from centre to centre of the piers, and next to this is the huge cantilever bridge over the Forth estuary, with its two spans of seventeen hundred feet each. The proposed Hudson River bridge, if built, will greatly surpass even this, the middle span being twenty-eight hundred and fifty feet, or more than half a mile from centre to centre of the piers. In construction, this gigantic affair is intended to be a suspension bridge, with cables forty inches in diameter, those of the Brooklyn bridge being sixteen inches, but the cables are furnished with a system of lattice trussing which appears novel, and the towers, instead of being of stone, as in the Brooklyn and most other large suspension-bridges, are of iron lattice-work. These towers are figured on the diagram as five hundred feet high, so that the structure would have a most imposing effect, and with six railroad tracks traversing it, as the plan contemplates, there would be few more interesting structures in the world.

FIRE AND WATER mentions a device of some value for promoting the efficiency of that simple fire-extinguishing apparatus, a pail of water. According to insurance statistics, more fires are put out by water-pails than by all other appliances put together, and they ought to be always within reach. In point of fact, however, although the pails are generally provided abundantly in hotels and office-buildings, the water is very apt to be wanting, and even if kept full, the pails are often borrowed for some purpose and not returned, so that when most needed they are of no avail. A common way of meeting this difficulty is to use pails with round or conical bottoms, which will not stand on a floor, and are, therefore, not likely to be borrowed, but this formation seriously diminishes the value of the pail as a fire-extinguisher, since a man with two of them in his hands, arriving at the scene of action, cannot use either without setting the other on the floor and losing all its contents. As an improvement on this, a mill-manager, who had found it difficult to keep the fire-pails filled and in order, recently fitted up the hooks carrying the pails with pieces of spring-steel, strong enough to lift the pail when nearly empty, but not sufficiently so to lift a full pail. Just over each spring, in such a position as to be out of the way of the handle of the pail, was set a metal point connected with a wire from an open-circuit battery. So long as the pails were full, their weight, when hung on their hooks, kept the springs down, but as soon as one was removed or lost a considerable portion of its contents by evaporation, the spring on its hook would rise, coming in contact with the metal point, thus closing the battery-circuit and ringing a bell in the manager's office, at the same time showing on an annunciator where the trouble was. As the bell continued to ring until the weight of the delinquent pail was restored, it was impossible to disregard the summons, and the ingenious manager found no more reason to complain of the condition of his fire-buckets.

SAFE BUILDING.—XXII.[1]

Example.

A girder carries the end of a beam, on which there is a uniform load of two thousand pounds. The beam is four inches thick, and of Georgia pine. What size must the stirrup-iron be?

Example stirrup-irons. THE shearing strain at each end of the beam will, of course, be one thousand pounds, which will be the load on stirrup-irons. (See Table VII). From Table IV we find for Georgia pine, *across* the fibres, $\left(\frac{c}{f}\right)=200$, we have, therefore, for the width of stirrup-iron from Formula (69)

$$x=\frac{1000}{4.200}=1\tfrac{1}{4}''$$

Therefore the thickness of iron from Formula (71) should be

$$y=\frac{1000}{16000.1\frac{1}{4}}=\frac{1}{20}''$$

we must make the iron however at least $\frac{1}{4}''$ thick and therefore use a section of $1\frac{1}{4}\times\frac{1}{4}''$.

In calculating ordinary floor-beams the shearing strain can be overlooked, as a rule; for, in calculating transverse strength we allow only the safe stress on the fibres of the upper and lower edges, while the intermediate fibres are less and less strained, those at the neutral axis not at all. The reserve strength of these only partially used fibres will generally be found quite ample to take up the shearing strain.

Rectangular beams. The formulæ for transverse strength are quite complicated, but for rectangular sections (wooden beams) they can be very much simplified *provided we are calculating for strength only and not taking deflection into account.*

Remembering that the moment of resistance of a rectangular section is (Table I) $=\frac{b.d^2}{6}$ and inserting into Formula (18) the value for m according to the manner of loading and taken from (Table VII), we should have:

For uniform load on beam.

Transverse strength of rectangular beams.

$$u=\frac{b.d^2}{9.L}\cdot\left(\frac{k}{f}\right) \qquad (72)$$

For centre load on beam.

$$w=\frac{b.d^2}{18.L}\cdot\left(\frac{k}{f}\right) \qquad (73)$$

For load at any point of beam.

$$w_i=\frac{b.d^2.L}{72.M.N}\cdot\left(\frac{k}{f}\right) \qquad (74)$$

For uniform load on cantilever.

$$u=\frac{b.d^2}{36.L}\cdot\left(\frac{k}{f}\right) \qquad (75)$$

For load concentrated at end of cantilever.

$$w=\frac{b.d^2}{72.L}\cdot\left(\frac{k}{f}\right) \qquad (76)$$

For load at any point of cantilever.

$$w_i=\frac{b.d^2}{72.Y}\cdot\left(\frac{k}{f}\right) \qquad (77)$$

Where $u=$ safe uniform load, in pounds.

Where $w=$ safe centre load on beam, in pounds; or safe load at end of cantilever, in pounds.

[1] Continued from page 10, No. 628.

Where $w_i=$ safe concentrated load, in pounds, at any point.

Where $Y=$ length, in feet, from wall to concentrated load (in cantilever).

Where M and $N=$ the respective lengths, in feet, from concentrated load on beam to each support.

Where $L=$ the length, in feet, of span of beam, or length of cantilever.

Where $b=$ the breadth of beam, in inches.

Where $d=$ the depth of beam, in inches.

Where $\left(\frac{k}{f}\right)=$ the safe modulus of rupture, per square inch, of the material of beam or cantilever (see Table IV).

The above formulæ are for rectangular wooden beams supported against lateral flexure (or yielding sideways). Where beams or girders are not supported sideways the thickness should be equal to at least half of the depth.

No allowance for deflection. *The above formulæ make no allowance for deflection,* and except in cases, such as factories, etc., where strength only need be considered and not the danger of cracking plastering, or getting floors too uneven for machinery, are really of but little value. They are so easily understood that the simplest example will answer:

Example.

Take a 3″ × 10″ hemlock timber and 9 feet long (clear span), loaded in different ways, what will it safely carry? taking no account of deflection.

The safe modulus of rupture $\left(\frac{k}{f}\right)$ for hemlock from Table IV is

$$=750 \text{ pounds.}$$

If both ends are supported and the load is uniformly distributed the beam will safely carry, (Formula 72):

$$u=\frac{3.10^2}{9.9}\,.\,750=2778 \text{ pounds.}$$

If both ends are supported and the load concentrated at the centre, the beam will safely carry, (Formula 73):

$$w=\frac{3.10^2}{18.9}\,.\,750=1389 \text{ pounds.}$$

If both ends are supported and the load is concentrated at a point I, distant four feet from one support (and five feet from the other) the beam will safely carry, (Formula 74):

$$w_i=\frac{3.10^2.9}{72.4.5}\,.\,750=1406 \text{ pounds.}$$

If one end of the timber is built in and the other end free and the load uniformly distributed, the cantilever will safely carry, (Formula 75):

$$u=\frac{3.10^2}{36.9}\,.\,750=694 \text{ pounds.}$$

If one end is built in and the other end free, and the load concentrated at the free end, the cantilever will safely carry, (Formula 76):

$$w=\frac{3.10^2}{72.9}\,.\,750=347 \text{ pounds.}$$

If one end is built in and the other end free, and the load concentrated at a point I, which is 5 feet from the built-in end, the cantilever will safely carry, (Formula 77):

$$w_i=\frac{3.10^2}{72.5}\,.\,750=625 \text{ pounds.}$$

Where, however, the span of the beam, in feet, greatly exceeds the depth in inches, (see Table VIII), and regard must be had to deflection, the formulæ (28) and (29) also (37) to (42) should always be used, inserting for i its value from Table I, section No. 2, or:

$$i=\frac{b.d^3}{12}$$

Where $b=$ the thickness of timber in inches.

Where $d=$ the depth of timber, in inches.

Where $i=$ the moment of inertia of the cross-section, in inches.

Table IX, however, gives a much easier method of calculating wooden beams, allowing for both rupture and deflection and Formulæ

GLOSSARY OF SYMBOLS.—The following letters, *in all cases*, will be found to express the same meaning, *unless distinctly otherwise stated*, viz.:—

a = *area*, in square inches.
b = *breadth*, in inches.
c = constant for *ultimate resistance to compression*, in pounds, per square inch.
d = *depth*, in inches.
e = constant for *modulus of elasticity*, in pounds-inch, that is, pounds per square inch.
f = *factor-of-safety*.
g = constant for *ultimate resistance to shearing*, per square inch, across the grain.
g_i = constant for *ultimate resistance to shearing*, per square inch, lengthwise of the grain.
h = *height*, in inches.
i = *moment of inertia*, in inches. [See Table I.]
k = *ultimate modulus of rupture*, in pounds, per square inch.
l = *length*, in inches.
m = *moment or bending moment*, in pounds-inch.
n = *constant* in Rankine's formula for compression of long pillars. [See Table I.]
o = the *centre*.
p = the *amount* of the *left-hand re-action* (or support) of beams, in pounds.
q = the *amount* of the *right-hand re-action* (or support) of beams, in pounds.
r = *moment of resistance*, in inches. [See Table I.]
s = *strain*, in pounds.
t = constant for *ultimate resistance to tension*, in pounds, per square inch.
u = *uniform load*, in pounds.
v = *stress*, in pounds.
w = *load at centre*, in pounds.
x, y and z signify *unknown quantities*, either in pounds or inches.
δ = *total deflection*, in inches.
ρ^2 = *square of the radius of gyration*, in inches. [See Table I.]
𝔇 = *diameter*, in inches.
𝔯 = *radius*, in inches.
π = 3.14159, or, say, 3 1-7 signifies the *ratio of the circumference and diameter of a circle.*

If there are more than one of each kind, the second, third, etc., are indicated with the Roman numerals as, for instance, a, a_i, a_{ii}, a_{iii}, etc., or b, b_i, b_{ii}, b_{iii}, etc.

In taking moments, or bending moments, strains, stresses, etc., to signify at what point they are taken, the letter signifying that point is added, as, for instance:—

m = moment or bending moment at *centre*.
m_A = " " " *point A.*
m_B = " " " *point B.*
m_X = " " " *point X.*
s = strain at *centre*.
s_B = " *point B.*
s_X = " *point X.*
v = stress at *centre*.
v_D = " *point D.*
v_X = " *point X.*
w = load at *centre*.
w_A = " *point A.*

(72) to (77) have only been given here, as they are often erroneously given in text-books, as the only calculations necessary for beams.

Basis of Tables XII & XIII. To still further simplify to the architect the labor of calculating wooden beams or girders, the writer has constructed Tables XII and XIII.

Table XII is calculated for floor-beams of dwellings, offices, churches, etc., at 90 pounds per square foot, including weight of construction. The beams are supposed to be cross-bridged.

Table XIII is for isolated girders, or lintels, uniformly loaded, and supported sideways.

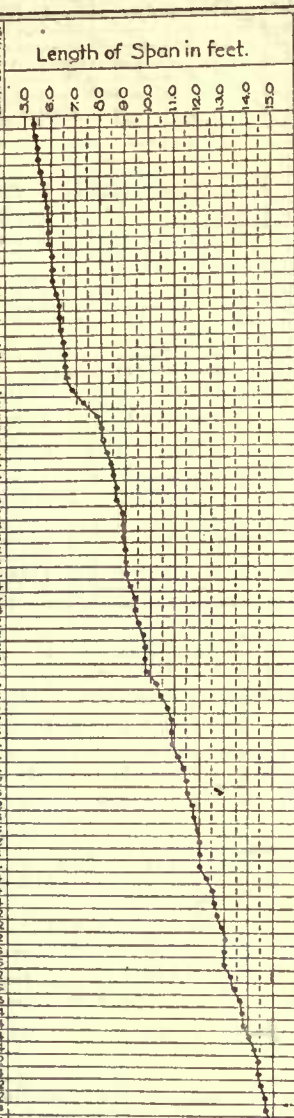
When not supported sideways decrease the load, or else use timber at least half as thick as it is deep.

In no case will beams or girders (with the loads given) deflect sufficiently to crack plastering.

TABLE XII.

WOODEN FLOOR-BEAMS.

[Calculated for 90 pounds per square foot of floor.]



Length of Span in feet.	Material of Beam.	Area of cross sec. in inches	Thickness in inches.	Depth in Inches.	Distance bet. centres in ins.	Area of sec. in ins. per sq. ft. floor	Area of sec. in ins., per sq. ft. floor for each wood.			
5-3	Hemlock	12	3	4	16	90	90			
5-4	Spruce or W. P.	12	3	4	16	90		90		
5-5	W. Oak	12	3	4	16	90			90	
5-6	Hemlock	12	3	4	14	103	103			
5-7	Spruce or W. P.	12	3	4	14	103		103		
5-8	W. Oak	12	3	4	14	103			103	
5-9	Hemlock	12	3	4	12	120	120			
5-9	Hemlock	16	4	4	16	120	120			
5-10	Spruce or W. P.	12	3	4	12	120		120		
5-10	Spruce or W. P.	16	4	4	16	120		120		
5-11	Geo. Pine	12	3	4	16	90				90
6-0	W. Oak	12	3	4	12	120			120	
6-0	W. Oak	16	4	4	16	120			120	
6-0	Hemlock	16	4	4	14	137	137			
6-2	Spruce or W. P.	16	4	4	14	137		137		
6-3	Geo. Pine	12	3	4	14	103				103
6-3	W. Oak	16	4	4	14	137			137	
6-4	Hemlock	16	4	4	12	160	160			
6-5	Spruce or W. P.	16	4	4	12	160		160		
6-6	Geo. Pine	12	3	4	12	120				120
6-6	Geo. Pine	16	4	4	16	120				120
6-7	W. Oak	16	4	4	12	160			160	
6-10	Geo. Pine	16	4	4	14	137				137
7-3	Geo. Pine	16	4	4	12	160				160
7-10	Hemlock	18	3	6	16	135	135			
8-0	Spruce or W. P.	18	3	6	16	135		135		
8-1	W. Oak	18	3	6	16	135			135	
8-2	Hemlock	18	3	6	14	154	154			
8-4	Spruce or W. P.	18	3	6	14	154		154		
8-6	W. Oak	18	3	6	14	154			154	
8-7	Hemlock	18	3	6	12	180	180			
8-7	Hemlock	24	4	6	16	180	180			
8-10	Spruce or W. P.	18	3	6	12	180		180		
8-10	Spruce or W. P.	24	4	6	16	180		180		
8-11	Geo. Pine	18	3	6	16	135				135
9-0	W. Oak	18	3	6	12	180			180	
9-0	W. Oak	24	4	6	16	180			180	
9-0	Hemlock	24	4	6	14	206	206			
9-2	Spruce or W. P.	24	4	6	14	206		206		
9-4	Geo. Pine	18	3	6	14	154				154
9-4	W. Oak	24	4	6	14	206			206	
9-6	Hemlock	24	4	6	12	240	240			
9-8	Spruce or W. P.	24	4	6	12	240		240		
9-9	Geo. Pine	18	3	6	12	180				180
9-9	Geo. Pine	24	4	6	16	180				180
9-10	W. Oak	24	4	6	12	240			240	
10-3	Geo. Pine	24	4	6	14	206				206
10-5	Hemlock	24	3	8	16	180	180			
10-8	Spruce or W. P.	24	3	8	16	180		180		
10-10	Geo. Pine	24	4	6	12	240				240
10-10	W. Oak	24	3	8	16	180			180	
10-11	Hemlock	24	3	8	14	206	206			
11-2	Spruce or W. P.	24	3	8	14	206		206		
11-4	W. Oak	24	3	8	14	206			206	
11-6	Hemlock	24	3	8	12	240	240			
11-6	Hemlock	32	4	8	16	240	240			
11-9	Spruce or W. P.	24	3	8	12	240		240		
11-9	Spruce or W. P.	32	4	8	16	240		240		
11-11	Geo. Pine	24	3	8	16	180				180
12-0	W. Oak	24	3	8	12	240			240	
12-0	W. Oak	32	4	8	16	240			240	
12-0	Hemlock	32	4	8	14	274	274			
12-3	Spruce or W. P.	32	4	8	14	274		274		
12-6	Geo. Pine	24	3	8	14	206				206
12-6	W. Oak	32	4	8	14	274			274	
12-8	Hemlock	32	4	8	12	320	320			
12-11	Spruce or W. P.	32	4	8	12	320		320		
13-0	Geo. Pine	24	3	8	12	240				240
13-0	Geo. Pine	32	4	8	16	240				240
13-0	Hemlock	30	3	10	16	225	225			
13-2	W. Oak	32	4	8	12	320			320	
13-4	Spruce or W. P.	30	3	10	16	225		225		
13-7	W. Oak	30	3	10	16	225			225	
13-8	Hemlock	30	3	10	14	257	257			
13-9	Geo. Pine	32	4	8	14	274				274
14-0	Spruce or W. P.	30	3	10	14	257		257		
14-2	W. Oak	30	3	10	14	257			257	
14-4	Hemlock	30	3	10	12	300	300			
14-4	Hemlock	40	4	10	14	343	343			
14-6	Geo. Pine	32	4	8	12	320				320
14-8	Spruce or W. P.	30	3	10	12	300		300		
14-8	Spruce or W. P.	40	4	10	16	300		300		
14-11	Geo. Pine	30	3	10	16	225				225

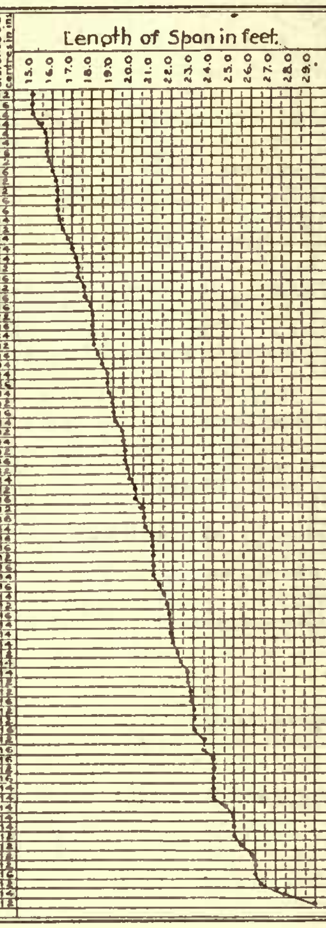
For convenience Table XII has been divided into two parts, the first part giving beams of from 5′ 0″ to 15′ 0″ span, the second part of from 15′ 0″ to 29′ 0″ span.

How to use Table XII. The use of the table is very simple and enables us to select the most economical beam in each case. For instance we have say a span of 21′ 6″. We use the second part of Table XII. The vertical dotted line between 21′ 0″ and 22′ 0″ is, of course, our line for 21′ 6″. We pass our finger down this line till we strike the curve. To the left opposite the point at which we struck the curve, we read:

21.6 spruce, W. P. 56 — 4-14-14 or:

at 21′ 6″ span we can use spruce or white-pine floor beams, of 56 inches sectional area each, viz: 4″ thick, 14″ deep and 14″ from centres. Of course we can use any other beam *below* this point, as they are all stronger and stiffer, but we must not use any other beam *above* this point. Now then, is a 4″ × 14″ beam of spruce or white pine, and 14″ from centres the most economical beam. We pass to the columns at the right of the curve and there read in the first column 48, 0. This means that while the sectional area of the beam is 56 square inches, it is equal to only 48 square inches *per square foot of floor*, as the beams are more than one foot from centres. In this column the areas are all reduced to the "area per square foot of floor," so that we can see at a glance if there is any cheaper beam *below* our point. We find below it, in fact, many cheaper beams, the smallest area (per square foot of floor) being, of course, the most economical. The smallest area we find is 36, 0 or 36 square inches of section per square foot of floor (this we find three times, in the sixteenth, twenty-ninth and thirty-first lines from the bottom). Passing to the left we find they represent, respectively, a Georgia pine beam, 3″ thick, 16″ deep and 16″ from centres; or a Georgia pine beam 3″ thick, 14″ deep and 14″ from centres; or a white oak beam 3″ thick, 16″ deep and 16″ from centres. If therefore, we do not consider depth, or distance from centres, it would simply be a question, which is cheaper, 48 inches (or four feet "board-measure") of white pine or spruce, or 36 inches (or three feet "board-measure") of either white oak or Georgia pine. The four other columns on the right hand side, are for the same purpose, only the figures for each kind of wood are in a column by themselves; so that, if we are limited to any kind of wood we can examine the figures for that wood by themselves. Take our last case and suppose we are limited to the use of hemlock; now from the point where our vertical line (21′ 6″) first struck the curve, we pass to the right-hand side of Table, to the second column, which is headed "Hemlock." From this point we seek the smallest figure *below* this level, but in the same column; we find, that the first figure we strike, viz: 41, 2 is the smallest, so we use this; passing along its level to the left we find it represents a hemlock beam of 48 square inches cross-section, or 3″ thick, 16″ deep and 14″ from centres.

TABLE XII. — (CONTINUED.)



Length of Span in feet.	Material of Beam	Area of cross sec. in inches	Thickness in inches.	Depth in inches.	Distance bet. centres in ins.	Area of section in ins. per sq. ft. of floor	Area of section in inches per sq. ft. of floor for each wood			
15-0	W. Oak	30	3	10	12	30.0			30.0	
15-0	W. Oak	40	4	10	16	30.0			30.0	
15-0	Hemlock	40	4	10	14	34.3	34.3			
15-4	Spruce or W. P.	40	4	10	14	34.3		34.3		
15-5	Geo. Pine	30	3	10	14	25.7				25.7
15-6	W. Oak	40	4	10	14	34.3			34.3	
15-8	Hemlock	36	3	12	16	27.0	27.0			
15-10	Hemlock	40	4	10	12	40.0	40.0			
16-0	Spruce or W. P.	36	3	12	16	27.0		27.0		
16-2	Spruce or W. P.	40	4	10	12	40.0		40.0		
16-3	Geo. Pine	30	3	10	12	30.0				30.0
16-3	Geo. Pine	40	4	10	16	30.0				30.0
16-3	W. Oak	36	3	12	16	27.0			27.0	
16-4	Hemlock	36	3	12	14	30.9	30.9			
16-5	W. Oak	40	4	10	12	40.0			40.0	
16-9	Spruce or W. P.	36	3	12	14	30.9		30.9		
17-0	W. Oak	36	3	12	14	32.0			32.0	
17-2	Geo. Pine	40	4	10	14	34.3				34.3
17-3	Hemlock	36	3	12	12	36.0	36.0			
17-3	Hemlock	48	4	12	16	36.0	36.0			
17-7	Spruce or W. P.	36	3	12	12	36.0		36.0		
17-7	Spruce or W. P.	48	4	12	16	36.0		36.0		
17-11	Geo. Pine	36	3	12	16	27.0				27.0
18-0	W. Oak	36	3	12	12	36.0			36.0	
18-0	W. Oak	48	4	12	16	36.0			36.0	
18-0	Hemlock	48	4	12	14	41.1	41.1			
18-1	Geo. Pine	40	4	10	12	40.0				40.0
18-3	Hemlock	42	3	14	16	31.5	31.5			
18-5	Spruce or W. P.	48	4	12	14	41.1		41.1		
18-8	Geo. Pine	36	3	12	14	30.9				30.9
18-8	Spruce or W. P.	42	3	14	16	31.5		31.5		
18-9	W. Oak	48	4	12	14	41.1			41.1	
18-11	Hemlock	48	4	12	12	48.0	48.0			
19-0	W. Oak	42	3	14	16	31.5			31.5	
19-1	Hemlock	42	3	14	14	36.0	36.0			
19-3	Spruce or W. P.	48	4	12	12	48.0		48.0		
19-6	Spruce or W. P.	42	3	14	14	36.0		36.0		
19-7	Geo. Pine	36	3	12	12	36.0				36.0
19-7	Geo. Pine	48	4	12	16	36.0				36.0
19-9	W. Oak	48	4	12	12	48.0			48.0	
19-10	W. Oak	42	3	14	14	36.0			36.0	
20-1	Hemlock	42	3	14	12	42.0	42.0			
20-1	Hemlock	56	4	14	16	42.0	42.0			
20-6	Spruce or W. P.	42	3	14	12	42.0		42.0		
20-6	Spruce or W. P.	56	4	14	16	42.0		42.0		
20-7	Geo. Pine	48	4	12	14	41.1				41.1
20-11	Geo. Pine	42	3	14	16	31.5				31.5
20-11	Hemlock	48	3	16	16	36.0	36.0			
21-0	W. Oak	42	3	14	12	42.0			42.0	
21-0	W. Oak	56	4	14	16	42.0			42.0	
21-0	Hemlock	56	4	14	14	48.0	48.0			
21-4	Spruce or W. P.	48	3	16	16	36.0		36.0		
21-6	Spruce or W. P.	56	4	14	14	48.0		48.0		
21-6	Geo. Pine	48	4	12	12	48.0				48.0
21-9	W. Oak	48	3	16	16	36.0			36.0	
21-10	Hemlock	48	3	16	14	41.1	41.1			
21-10	Geo. Pine	42	3	14	14	36.0				36.0
21-11	W. Oak	56	4	14	14	48.0			48.0	
22-2	Hemlock	56	4	14	12	56.0	56.0			
22-4	Spruce or W. P.	48	3	16	14	41.1		41.1		
22-6	W. Oak	48	3	16	14	41.1			41.1	
22-8	Spruce or W. P.	56	4	14	12	56.0		56.0		
22-10	Geo. Pine	42	3	14	12	42.0				42.0
22-10	Geo. Pine	56	4	14	16	42.0				42.0
23-0	W. Oak	56	4	14	12	56.0			56.0	
23-0	Hemlock	48	3	16	12	48.0	48.0			
23-0	Hemlock	64	4	16	16	48.0	48.0			
23-5	Spruce or W. P.	48	3	16	12	48.0		48.0		
23-5	Spruce or W. P.	64	4	16	16	48.0		48.0		
23-11	Geo. Pine	48	3	16	16	36.0				36.0
24-0	W. Oak	48	3	16	12	48.0			48.0	
24-0	W. Oak	64	4	16	16	48.0			48.0	
24-0	Hemlock	64	4	16	14	54.9	54.9			
24-0	Geo. Pine	56	4	14	14	48.0				48.0
24-7	Spruce or W. P.	64	4	16	14	54.9		54.9		
24-11	Geo. Pine	48	3	16	14	41.1				41.1
25-0	W. Oak	64	4	16	14	54.9			54.9	
25-3	Hemlock	64	4	16	12	64.0	64.0			
25-4	Geo. Pine	56	4	14	12	56.0				56.0
25-10	Spruce or W. P.	64	4	16	12	64.0		64.0		
26-0	Geo. Pine	48	3	16	12	48.0				48.0
26-0	Geo. Pine	64	4	16	16	48.0				48.0
26-3	W. Oak	64	4	16	12	64.0			54.9	
27-3	Geo. Pine	64	4	16	14	54.8				54.8
29-0	Geo. Pine	64	4	16	12	64.0				64.0

In case the size of the beam is known, its safe span can, of course, be found by reversing the above procedure, or if the depth of beam and span is settled, we can find the necessary thickness and distance between centres; in this way the Table, of course, covers every problem.

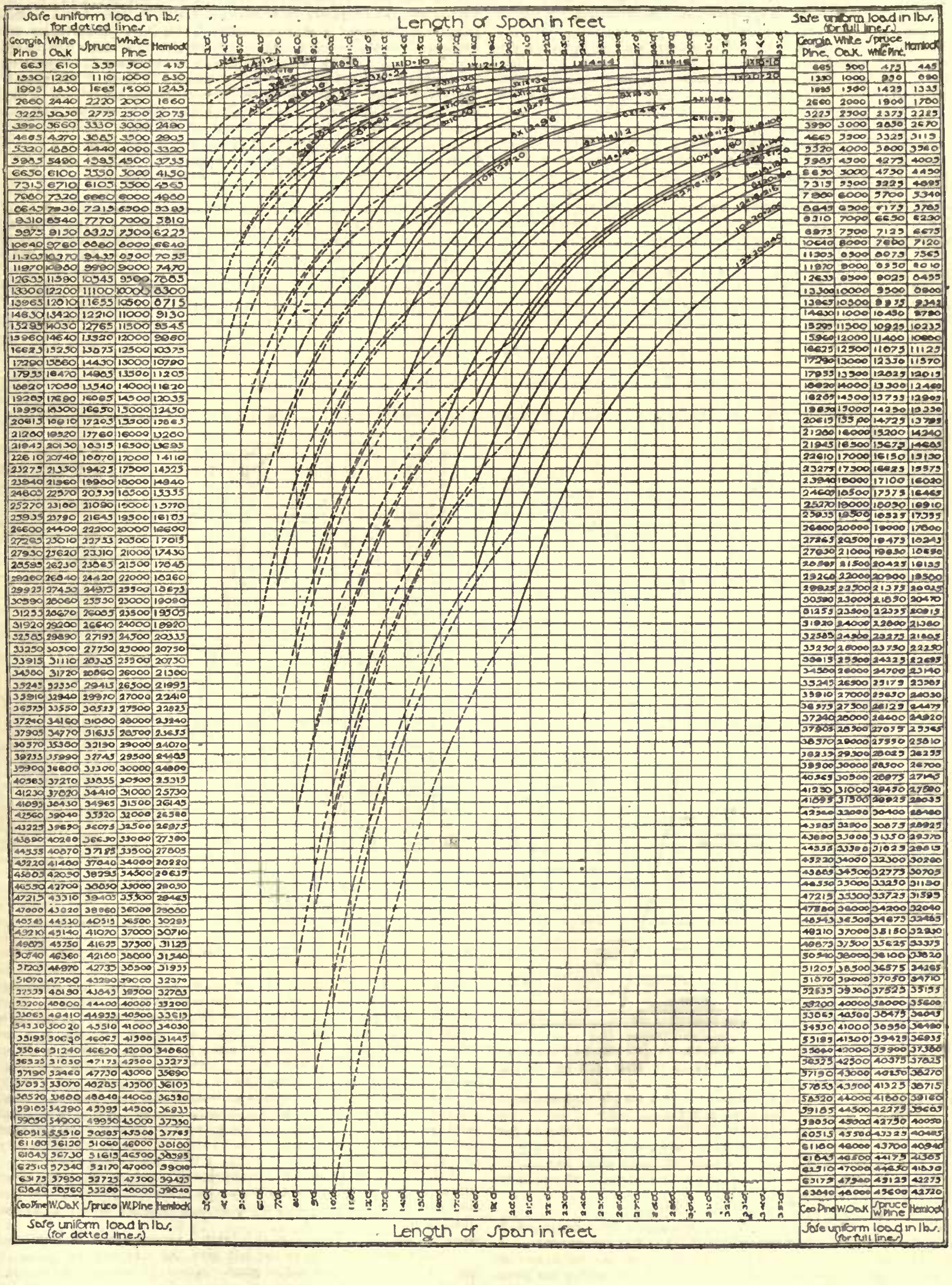
Table XIII is calculated for wooden girders of all sizes. Any thickness not given in the table can be obtained by taking the line for a girder of same depth, but one inch thick and multiplying by the thickness.

How to use Table XIII. The use of this table is very simple. The vertical columns to the left give the safe uniform loads on girders (sufficiently stiff not to crack plastering) for different woods: these apply to the dotted parts of curves. The columns on the right-hand side give the same, but apply to the parts of curves drawn in full lines.

TABLE XIII.

WOODEN GIRDERS, — BRACED SIDEWAYS.

[Safe uniform load in pounds.]



If we have a 6″ × 16″ Georgia pine beam of 20 feet span and want to know what it will carry, we select the curve marked at its upper end 6 × 16 = 96; we follow this curve till it intersects the vertical line 20′ 0″; as this is in the part of curve drawn full, we pass horizontally to the right and find under the column marked "Georgia Pine," 7980, which is the safe, uniform load in pounds. Supposing, however, we had simply settled the span, say 8 feet, and load, say 7000 pounds, and wished to select the most economical girder, being, we will say, limited to the use of white pine: the span not being great we will expect to strike the dotted part of curve, and therefore select the fourth (white pine) column *to the left*. We pass down to the nearest figure to 7000 and then pass horizontally to the right till we meet the vertical 8 feet line; this we find is, as we expected, at the dotted part, and therefore our selection of the left column was right. We follow the curve to its upper end and find it requires a girder 4″ × 12″ = 48 square inches. Now can we use a cheaper girder; of course, all the lines *under* and *to the right* of our curve are stronger, so that if either has a smaller sectional area, we will use it. The next curve we find is a 6″ × 10″ = 60″; then comes a 4″ × 14″ = 56″; then an 8″ × 10″ = 80″; then a 6″ × 12″ = 72″ and so on; as none has a smaller area we will stick to our 4″ × 12″ girder, provided it is braced or supported sideways. If not, to avoid twisting or lateral flexure, we must select the next cheapest section, where the thickness is at least equal to half the depth;[1] the cheapest section beyond our curve that corresponds to this, we find is the 6″ × 10″ girder, which we should use if not braced sideways.

In the smaller sections of girders where the difference between the the loads given from line to line is proportionally great, a safe load should be assumed between the two, according to the proximity to either line at which the curve cuts the vertical. The point where work, and to this should be added 70 pounds per square foot, which is the greatest load likely ever to be produced if packed solidly with people. Furniture rarely weighs as much, though heavy safes should be provided for separately. The load on roofs should be 30 pounds additional to the weight of construction, to provide for the weight of snow or wind. Look out for tanks, etc., on roofs. Plastered ceilings hanging from roofs add about 10 pounds per square foot, and slate about the same. Where a different load than given in the Table must be provided for, the distance between centres of beams can be reduced, proportionally from the next greater load; or the weight on each beam can be figured and the beam treated as a girder, supported sideways, in that case using Table XV. Both tables are calculated for the beams not to deflect sufficiently to crack plastering.

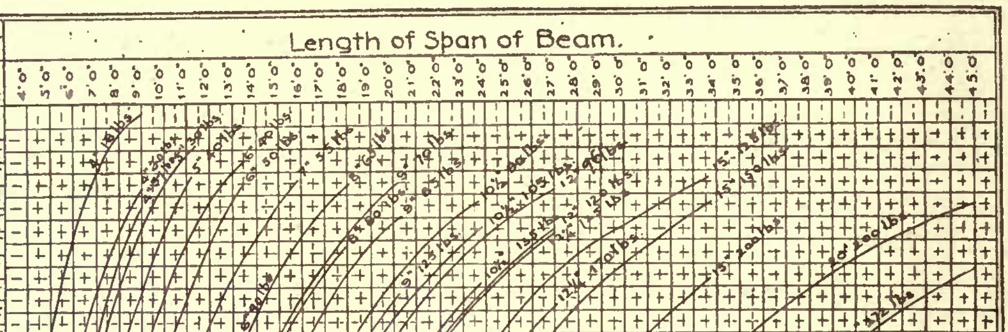
How to use Table XIV. The use of Table XIV is very simple. Supposing we have a span of 23 feet and a load of 150 pounds per square foot. We pass down the vertical line 23′ 0″ and strike first the 12″—96 pounds beam, which (for 150 pounds) is opposite (and half way between) 3′ 4″ and 3′ 8″ therefore 3′ 6″ from centres. The next beam is the 12″-120 pounds beam 4′ 4″ from centres; then the 12″-125 pounds beam 4′ 5″ from centres; then the 15″-125 pounds beam 5′ 6″ from centres and so on. It is simply a question therefore which "distance from centres" is most desirable and as a rule in fireproof buildings it is desirable to keep these as near alike as possible, so as not to have too many different spans of beam arches and centres. If economy is the only question, we divide the weight of beam by its distance from centres, and the curve giving the smallest result is, of course, the cheapest. Supposing however, that we desire all distances from centres alike, say 5 feet. In that case we pass down the 150-pound column to and then along the horizontal line 5′ 0″ till we strike the vertical

TABLE XIV.

IRON I-BEAMS FOR FLOORS,—150 POUNDS PER SQUARE FOOT.

Distances between Centres of Beams

300 lbs per □ ft	250 lbs per □ ft	200 lbs per □ ft	175 lbs per □ ft	150 lbs per □ ft	125 lbs per □ ft	100 lbs per □ ft
1′ 0″	1′ 0″	1′ 3″	1′ 5″	1′ 8″	2′ 0″	2′ 6″
1′ 0″	1′ 2″	1′ 6″	1′ 9″	2′ 0″	2′ 5″	3′ 0″
1′ 2″	1′ 5″	1′ 9″	2′ 0″	2′ 4″	2′ 10″	3′ 6″
1′ 4″	1′ 7″	2′ 0″	2′ 3″	2′ 8″	3′ 2″	4′ 0″
1′ 6″	1′ 10″	2′ 3″	2′ 7″	3′ 0″	3′ 7″	4′ 6″
1′ 8″	2′ 0″	2′ 6″	2′ 10″	3′ 4″	4′ 0″	5′ 0″
1′ 10″	2′ 2″	2′ 8″	3′ 2″	3′ 8″	4′ 5″	5′ 8″
2′ 0″	2′ 5″	3′ 0″	3′ 5″	4′ 0″	4′ 10″	6′ 0″
2′ 2″	2′ 7″	3′ 3″	3′ 9″	4′ 4″	5′ 2″	6′ 6″
2′ 4″	2′ 10″	3′ 6″	4′ 0″	4′ 8″	5′ 7″	7′ 0″
2′ 6″	3′ 0″	3′ 8″	4′ 3″	5′ 0″	6′ 0″	7′ 6″
2′ 8″	3′ 2″	4′ 0″	4′ 7″	5′ 4″	6′ 3″	8′ 0″
2′ 10″	3′ 5″	4′ 3″	4′ 10″	5′ 8″	6′ 10″	8′ 6″
3′ 0″	3′ 7″	4′ 6″	5′ 2″	6′ 0″	7′ 2″	9′ 0″
3′ 2″	3′ 10″	4′ 9″	5′ 5″	6′ 4″	7′ 7″	9′ 6″
3′ 4″	4′ 0″	5′ 0″	5′ 9″	6′ 8″	8′ 0″	10′ 0″
3′ 6″	4′ 2″	5′ 3″	6′ 0″	7′ 0″	8′ 5″	10′ 6″
3′ 8″	4′ 5″	5′ 6″	6′ 3″	7′ 4″	8′ 10″	11′ 0″
3′ 10″	4′ 7″	5′ 9″	6′ 7″	7′ 8″	9′ 2″	11′ 6″
4′ 0″	4′ 10″	6′ 0″	6′ 10″	8′ 0″	9′ 7″	12′ 0″
4′ 2″	5′ 0″	6′ 3″	7′ 2″	8′ 4″	10′ 0″	12′ 6″
4′ 4″	5′ 2″	6′ 6″	7′ 5″	8′ 8″	[illegible]	13′ 0″
4′ 6″	5′ 5″	6′ 9″	7′ 9″	9′ 0″	10′ 10″	13′ 6″
4′ 8″	5′ 7″	7′ 0″	8′ 0″	9′ 4″	11′ 2″	14′ 0″
4′ 10″	5′ 10″	7′ 3″	8′ 3″	9′ 8″	11′ 7″	14′ 6″
5′ 0″	6′ 2″	7′ 6″	8′ 7″	10′ 0″	12′ 0″	15′ 0″



For Steel Beams: Space one-quarter distance (between centres) larger than for iron beams; but length of span (in feet) must not exceed twice the depth of beam (in inches), or deflection will be too great for plastering.

the curve cuts the *bottom* horizontal line of each part is the length of span for which the safe load opposite the line is calculated.

Heavier Floors. Where a different load than 90 pounds per square foot, must be provided for, we can either increase the thickness of beams as found in Table XII, or decrease their distance from centres, either in proportion to the additional amount of load. Or, if we wish to be more economical, we can calculate the safe uniform load on *each* floor beam, and consider it as a separate girder, supported sideways, using of course, Table XIII.

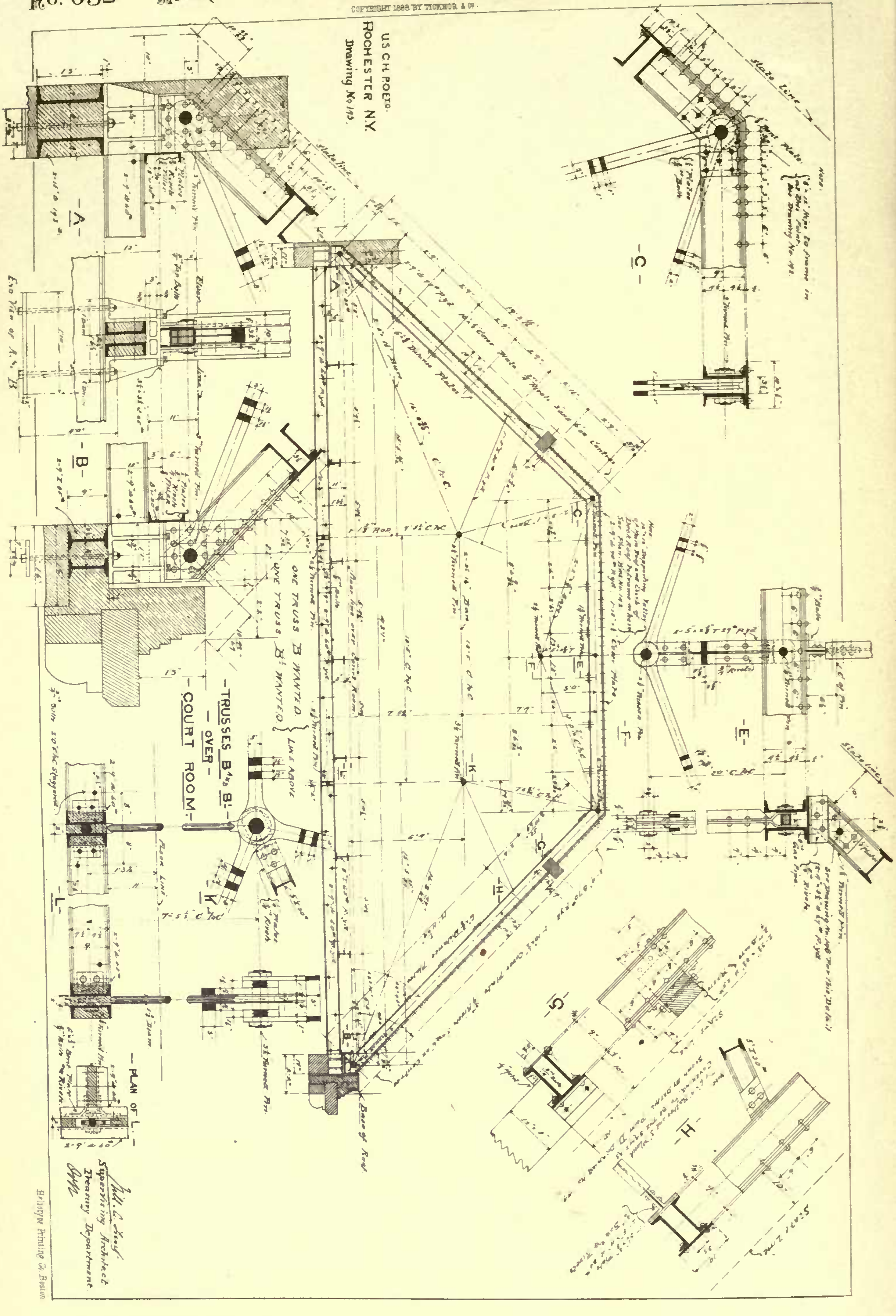
Basis of Tables XIV and XV. The Tables XIV and XV are very similar to the foregoing, but calculated for wrought-iron I-beams. Table XIV gives the size of beams and distance from centres required to carry different loads per square foot of floor, 150 pounds per square foot of floor (including the weight of construction), however, being the usual load allowed for in churches, office-buildings, public halls, etc., where the space between beams is filled with arched brickwork, or straight hollow-brick arches, and then covered over with concrete. A careful estimate, however, should be made of the exact weight of construction per square foot, including the iron-

[1] The rule for calculating the exact thickness will be found later, Formula (78).

(span) line, in this case 23′ 0″, and then take the cheapest beam to the right of the point of intersection. Thus in our case the nearest beam would be 15″-125 pounds; next comes 12¼″-170 pounds; then 15″-150 pounds, etc. As the nearest beam is the lightest in this case, we should select it. The weight of a beam is always given per yard of length. The reason for this is that a square inch of wrought-iron, one yard long, weighs exactly 10 pounds. Therefore if we know the weight per yard in pounds we divide it by ten to obtain the exact area of cross-section in square inches; or if we know the area, we multiply by ten and obtain the exact weight per yard.

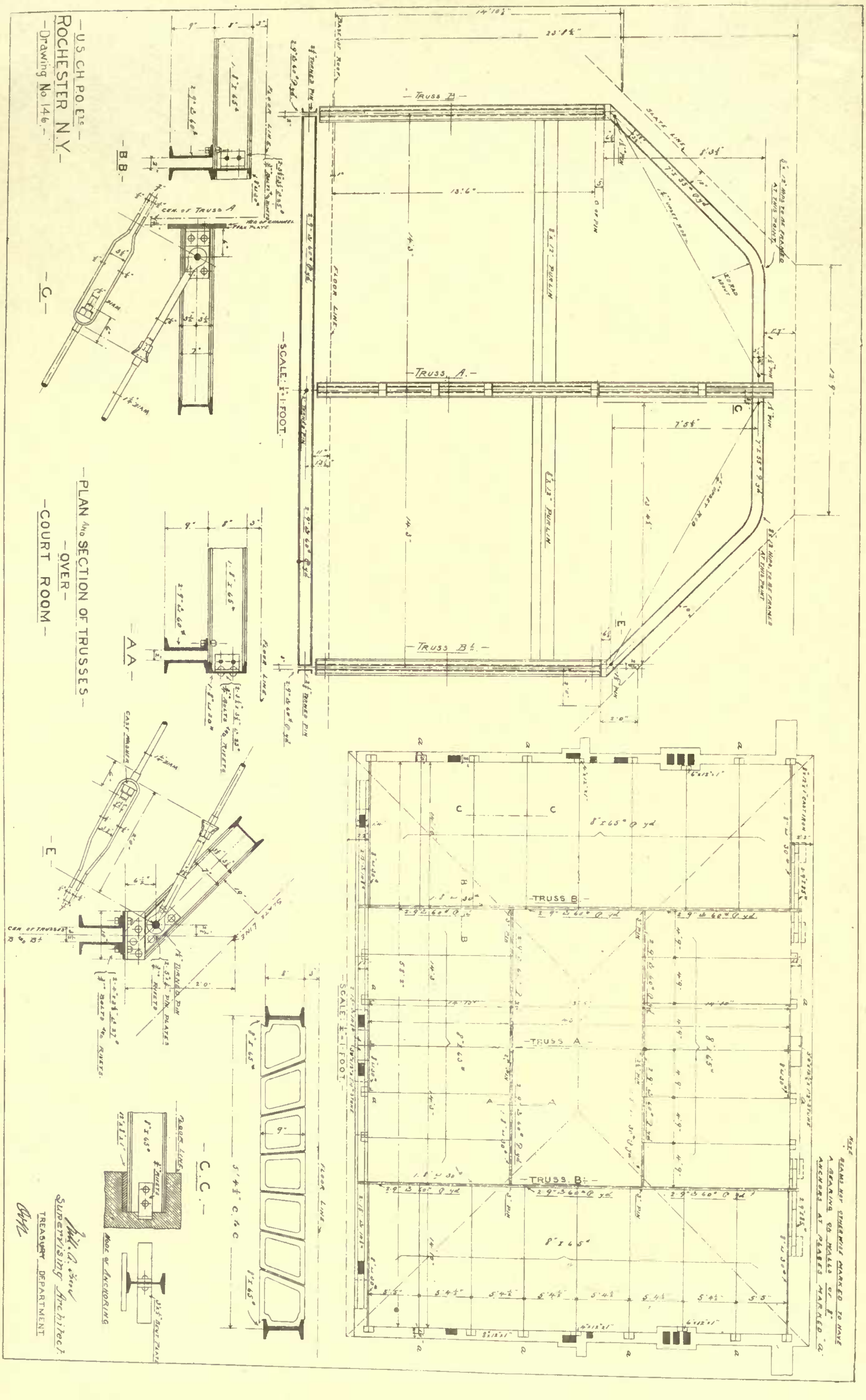
How to use Table XV. The use of Table XV, is very similar to that of Table XIII but that the safe uniform load is given (in the first column) in tons of 2000 pounds each. The continuation of the two 20″ beams up to 40 feet span is given in the separate table, in the lower right-hand corner. To illustrate the Table: if we have a span of say 19 feet we pass down its vertical line; the first curve we strike is the 10½″-90 pounds beam, which is one-quarter space beyond the horizontal line 6 (tons) therefore a 10½″-90 pounds beam at 19 feet span will carry safely 6¼ tons uniform load, and will not deflect sufficiently to crack plaster. (Each full horizontal

COPYRIGHT 1888 BY TICKNOR & CO.



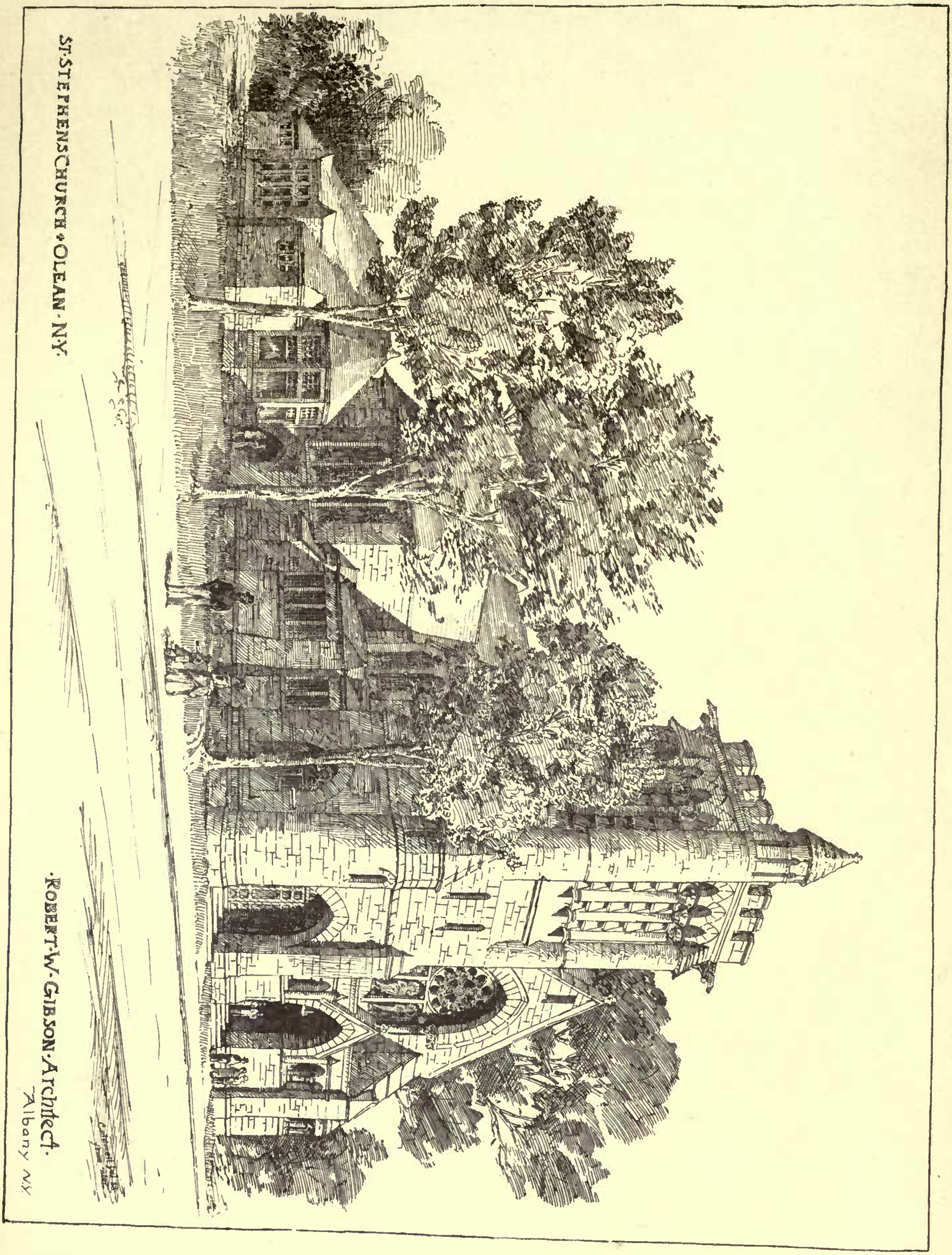
Heliotype Printing Co. Boston

COPYRIGHT 1888 BY TICKNOR & Co



Heliotype Printing Co. Boston

COPYRIGHT 1888 BY TICKNOR & Co



ST·STEPHENS CHURCH · OLEAN · N·Y·

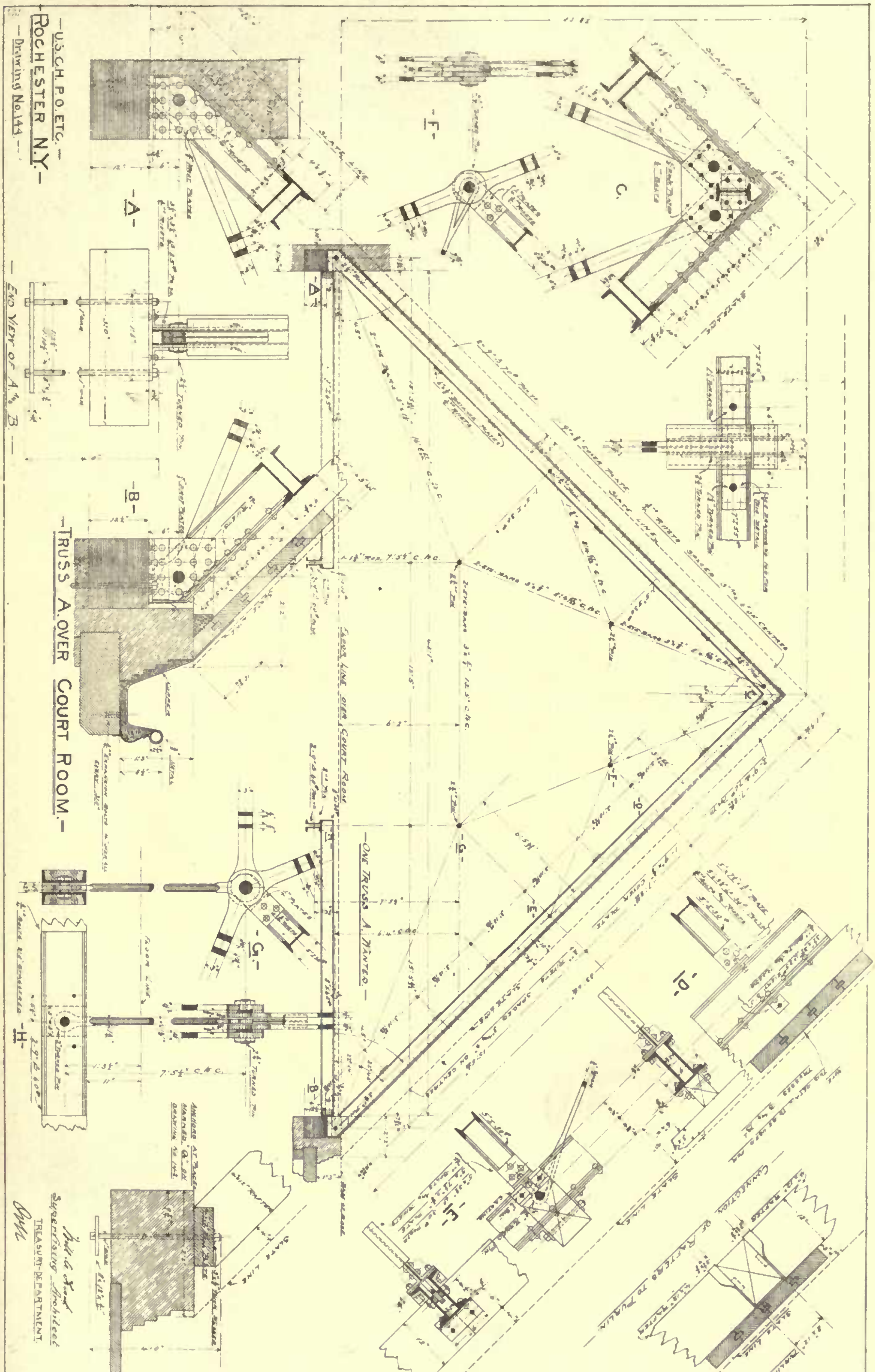
·ROBERT·W·GIBSON·Architect·
Albany N.Y.

Heliotype Printing Co. Boston.

COPYRIGHT 1888 BY TICKNOR & CO

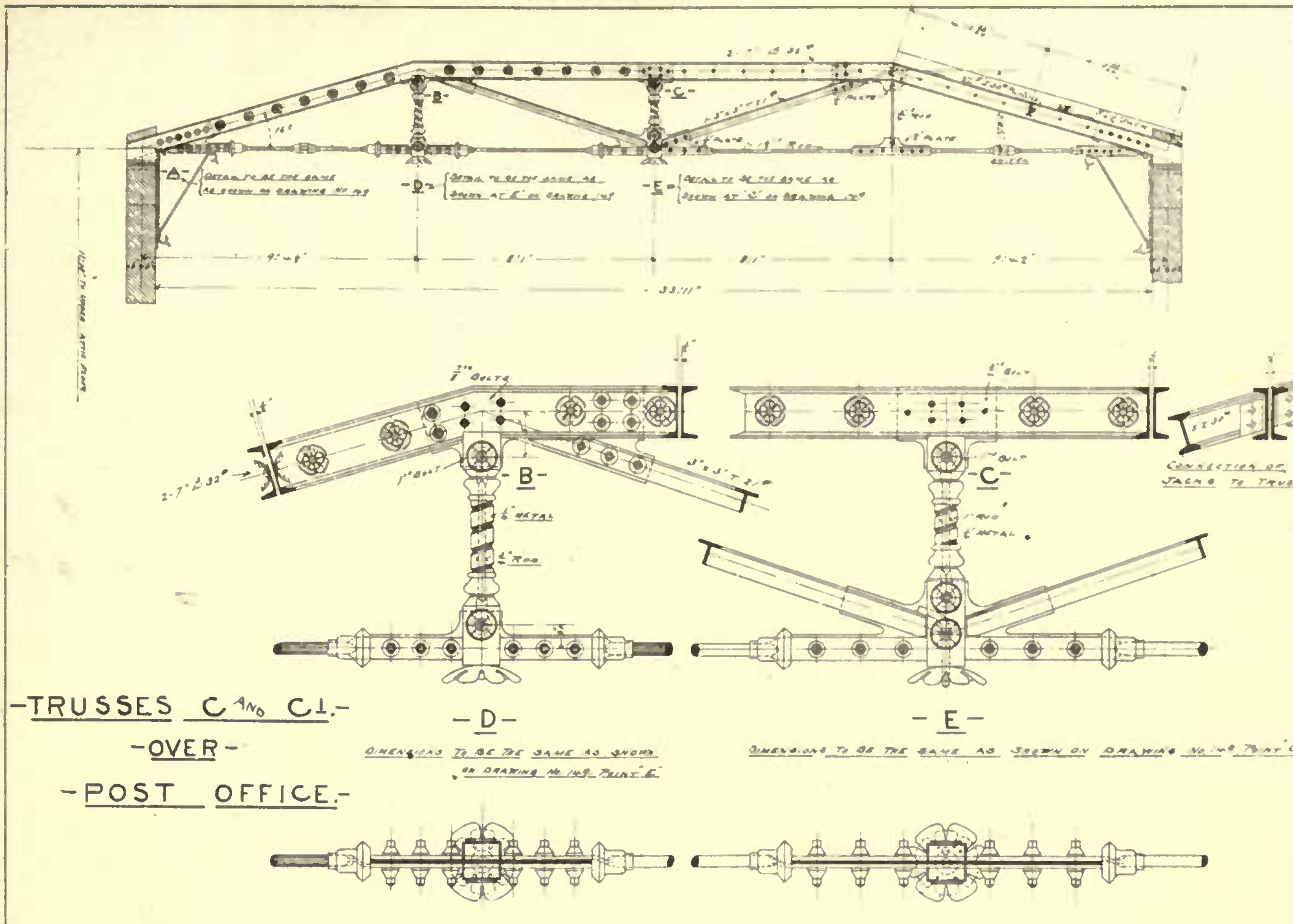
Heliotype Printing Co. Boston

COPYRIGHT 1888 BY TICKNOR & Co

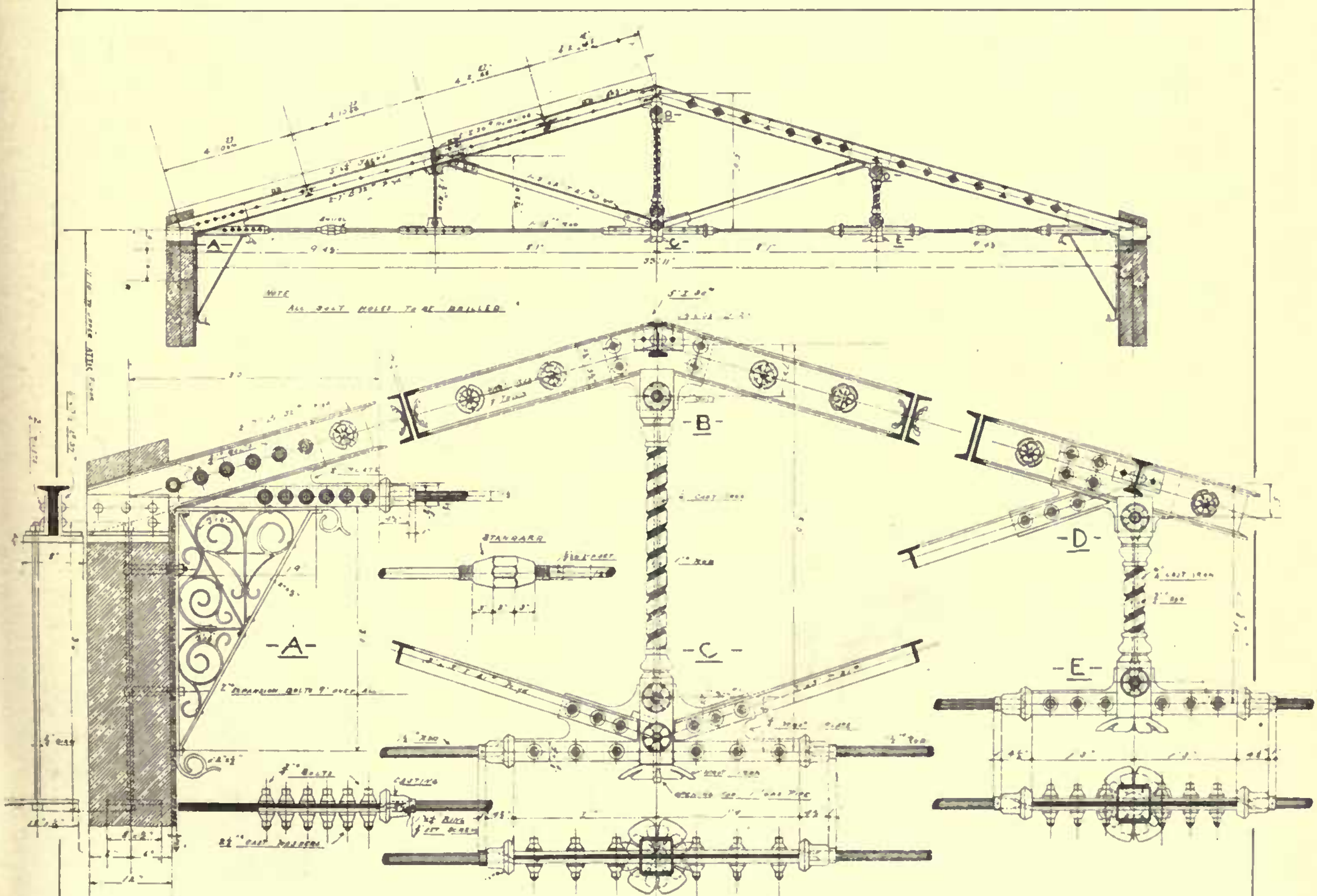


Heliotype Printing Co Boston

Copyright 1888 by Ticknor & Co



-TRUSSES C AND C1.-
-OVER-
-POST OFFICE.-



-TRUSSES E. D. AND D1 -
-WITH-
- DETAILS OF ROOF. -

U.S. CUST. HO. & P.O.
ROCHESTER N.Y.
Drawing No. 144.

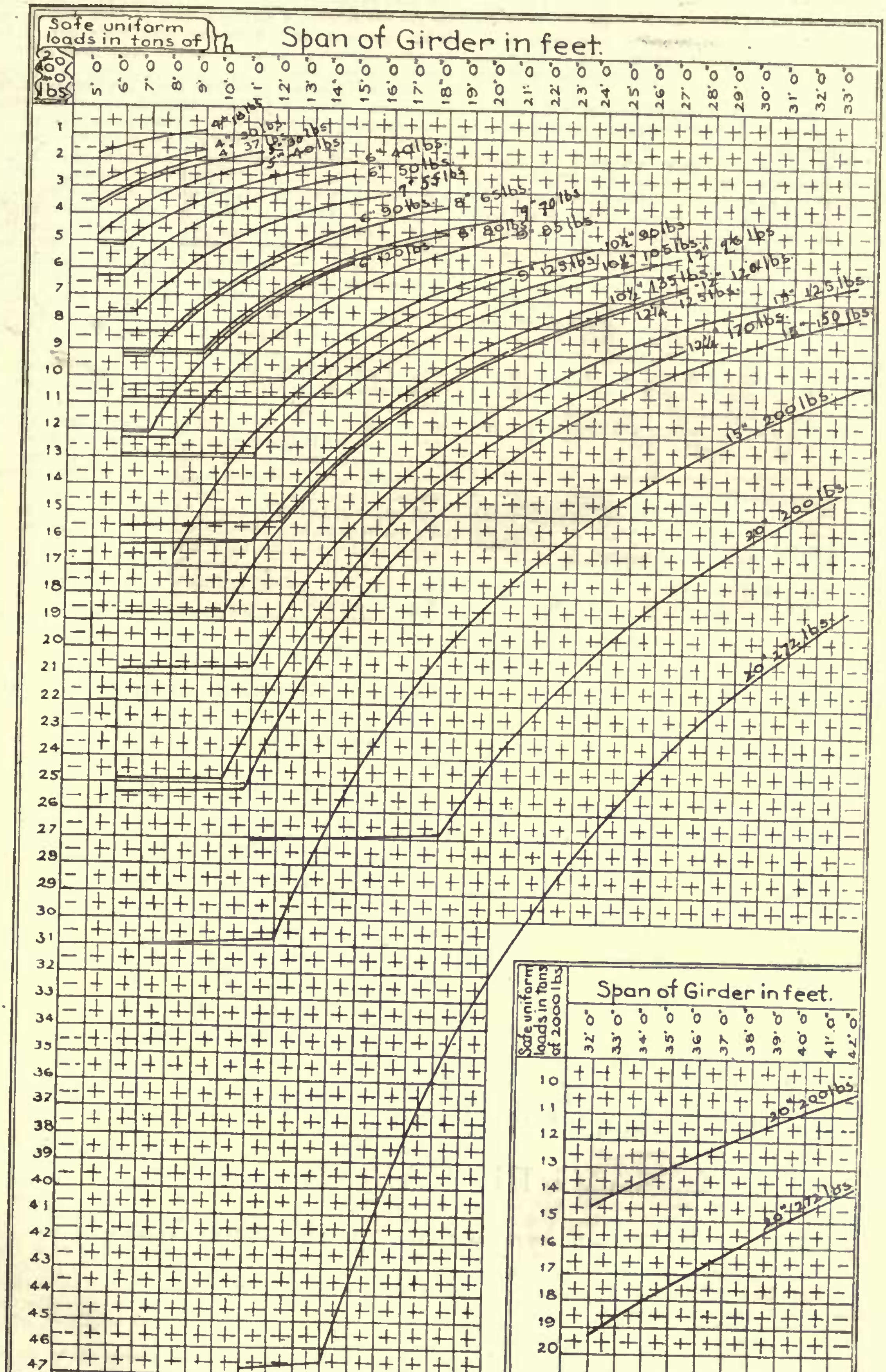
Supervising Architect
Treasury Department

Heliotype Printing Co. Boston

TABLE XV.

IRON I-BEAM GIRDERS, — BRACED SIDEWAYS.

[Safe uniform load in tons of 2000 pounds.]



For Steel Beams: Add one-quarter to safe uniform load on iron beams; but length of span (in feet) must not exceed twice the depth of beam (in inches), or deflection will be too great for plastering.

space represents one ton). The next beam at 19 feet span is $10\frac{1}{2}''$ – 105 pounds, which will safely carry $7\frac{1}{4}$ tons. Then comes the $12''$ – 96 pounds beam, which will safely carry $7\frac{3}{4}$ tons, and so on down to the $20''$ – 272 pounds beam, which will safely carry $33\frac{3}{4}$ tons.

If we know the span (say 17 feet) and uniform load (say $7\frac{1}{2}$ tons) to be carried, we pass down the span line 17′ 0″ and then horizontally along the load line $7\frac{1}{2}$ till they meet which in our case is at the $9''$ – 125 pounds beam; we can use this beam or any cheaper beam, whose curve is under it. We pass over the different curves *under* it, and find the cheapest to be the $12''$ – 96 pounds beam, which we, of course, use.

Iron beams must be scraped clean of rust and be well painted. They should not be exposed to dampness, nor to salt air or they will deteriorate and lose strength rapidly.

Steel beams. Steel beams are coming into use quite largely. They are cheaper to manufacture than iron beams, as they are made directly from the ore and in one process; while with iron beams the ore is first converted into cast iron, then into wrought iron, and then rolled. Steel beams, however, are not apt to be of uniform quality. Some may be even very brittle; they are however very much stronger than iron (fully 25 per cent stronger), but as their deflection is only about 9, 3 per cent less than that of iron beams, there is but very little economy of material possible in their use. If steel beams are used they can be spaced one quarter distance (between centres) farther apart than given in Table XIV for iron beams; or they will safely carry one quarter more load than given in Table XV; but in no case, where full load is allowed, must the span in feet, (of steel beams), exceed twice the depth in inches. With full safe loads the deflection of steel beams will always be greater than that of iron beams (about $\frac{1}{3}$ larger). Louis De Coppet Berg.

[To be continued.]

The Illustrations

[*Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.*]

THE HARVARD MEDICAL-SCHOOL BUILDING, BOSTON, MASS. MESSRS. WARE & VAN BRUNT, ARCHITECTS, BOSTON, MASS.

[Gelatine Print, issued only with the Imperial Edition.]

HOUSE FOR MR. H. R. SMITH, KANSAS CITY, MO.

The materials of this house are common brick with finish of pressed brick, the foundation walls being laid up in random stonework. Cost, about $6000.

TRUSSES OVER COURT-ROOM IN THE UNITED STATES COURT-HOUSE, ROCHESTER, N. Y. MR. W. FRERET, SUPERVISING ARCHITECT.

ST. STEPHEN'S CHURCH, OLEAN, N. Y. MR. R. W. GIBSON, ARCHITECT, ALBANY, N. Y.

BRICKLAYING IN FROSTY WEATHER.

Fire-dog. designed by Moreau Frères

A REPORT issued by the Foreign Office dealing with this subject is sufficiently important to the building interests in this country to induce us to draw attention to it. In this report — one on "Subjects of General and Commercial Interest" (No. 75) — the method of carrying on bricklayers' work in Norway is described. Mr. T. Mitchell, Consul-General at Christiania, having noticed during his residence in that country extensive building operations carried on in the depth of winter, which are generally suspended during frosty weather in England, sought information from Mr. Paul Due, one of the leading architects at Christiania, and his reply forms the chief portion of the report to which we refer. Mr. Paul Due has had experience in the United States as well as in Norway, and he says building during the months of winter has been practised at Christiania for at least twelve years. He mentions, amongst the public buildings erected in the capital during winter, the principal railway-station (1879–80), several public schools, and the Anglican Church (1883–84), which was commenced in November and opened in June, 1884, in addition to several private houses and mansions, all of which have stood, it is alleged, remarkably well, with one exception, owing to want of care in preparing the mortar. Mr. Due says: "In the use of unslaked lime lies the whole art of executing brickwork in frosty weather." The mortar prepared is "made in small quantities immediately before being used," and the proportion of unslaked lime is increased as the thermometer falls. "Warmth being developed by the use of unslaked lime, it is only a question of utilizing it so handily and quickly as to enable the mortar to bind with the bricks before it cools." The report further states that the degree of frost in which bricklayers' work can be done is variously estimated at between 6° to 8° Reaumur ($18\frac{1}{2}$° to 14° Fahr.), and 12° to 15° Reaumur (5° above to $1\frac{3}{4}$° below zero Fahr.). The Norwegian Society of Engineers and Architects have decided that the variation as to temperature is to be explained by the degree of care bestowed on the preparation of the mortar, and that by fixing a rule for the preparation, a maximum limit of frost may be determined. It has been found in practice that bricklayers' work at Christiania does not pay when the temperature is more than 14° to $9\frac{1}{2}$° Fahr. below freezing-point.

Such are the main propositions that have been put forward, and have given occasion to a number of paragraph-writers to draw some rather misleading conclusions as to the prospects of bricklayers and hodmen if they, or rather their employers, the master-builders, only adopt the Norwegian practice. There is nothing, however, very novel in the suggestion. In Berlin the erection of buildings has been carried on during frosty weather for years past, and it is only lately that the authorities issued an order forbidding any brickwork being undertaken when the temperature fell to or below 2° R. or 26° Fahr. It seems to have been overlooked also that the theory of mortar freezing but not setting at such a temperature has been before contradicted by German architects of repute. Herr Krause published in the *Baugewerke Zeitung* some time ago particulars of a building erected by him during a severe frost, the temperature being as low as 23° to 14° Fahr. The mortar began to freeze in the operation of laying the bricks, and much trouble was experienced in setting them. He had the lime slaked in small quantities, mixed the mortar with hot water, and the result was the work stood quite firm. When the building was pulled down some years afterwards, the mortar was found so hard that the bricks broke. In fact, it is a common opinion in Germany that frost rather improves than injures the brickwork under certain circumstances. It is necessary, however, to discover what the conditions are which promote these results. It would be unsafe and misleading to assert that, given a frost and unslaked lime, any brickwork can be erected that shall turn out to be sound. Herr Krause mentions a case in which a wall settled and bulged out after a sudden thaw, though a sudden frost made it again firm. Every experienced bricklayer will assert the same, and every builder and architect is aware of the effect of a thaw after a frost.

There are certain conditions necessary for the process mentioned in Mr. Due's statement. (1) The lime should be of exceptionally good quality, and be supplied in a burned, not slaked, condition, the proportion of lime being increased with the degree of frost. (2) The bricks should be kept dry and not exposed to the frost. (3) The frost must be continuous, not followed by a sudden thaw. These conditions — the last especially — are necessary for carrying on brickwork in frosty weather. A wall can only "freeze itself dry" when no moisture is present and the action of freezing continues for some days. When we take into consideration the chances there are against obtaining all these favorable conditions, the improbability of a steady frost and the want of care amongst workmen in the preparation of the mortar, it will be seen how little reliance can be placed upon following the rule in the majority of buildings. One of the main precautions stated in the Norwegian report is that "Bricks which have been out in the rain or exposed to the frost should never be used," which requires that they should be stacked under cover. The circumstances of most buildings render such care almost impossible. Unless the work is carried up as dry as possible, the warmth developed by the unslaked lime would be absorbed by the moisture; the mortar also should be as stiff as convenient for working and the bricks warm.

The thickness of main walls in Norway is never less than a brick and a half (15 in. English). It is also stated in the Memorandum that outside plastering is not possible in frosty weather for the reason that the manual labor in the cornices would require a longer time than the mortar does to lose its warmth. Even plastering to flat surface is seldom undertaken. Another clause states that in Norway the lime is always supplied to the market in a burned, not slaked condition.

The concluding remarks on wages and hours of labor are of interest. During summer the hours of labor are from 6 A. M. to 7 P. M., with three hours' rest for meals, etc. In winter the working hours are reduced by four hours, when they are from 8 A. M. to 3 P. M., with an hour's rest. The wages of a first-class bricklayer range from 4s. 6d. to 5s. in summer, in winter being regulated to that scale. A second-class bricklayer earns 3s. 4d. to 3s. 11d. per day of ten hours, and a hodman 2s. 3d. to 2s. 9d. per day. In frosty weather, the bricklayers use an additional thick woollen vest under the jacket, and the only stimulant used is coffee after dinner. These are facts worth noting by the English bricklayer, whose wages in London are $10\frac{1}{2}$d. per hour.

With regard to the suggestions thrown out by the report of the Consul-General at Christiania, we cannot see how they can be largely practised in this country. The preparing the mortar in small quantities, the use of dry bricks, the protection of the walls from rain and snow at night, would entail an extra cost of labor that could only be followed in special work requiring expedition. The use of unslaked lime and hot water in small works requiring completion during a frost is occasionally resorted to, but generally in these cases, the bricks have been stored in a heated room before

being used. The rapid changes from frost to thaw, followed, perhaps, by a freezing more intense than the first, render it undesirable, even when the materials can be obtained, to run the risk of carrying up any considerable amount of brickwork during the winter months in this country.

TESTING A COATED NAIL.

THERE have recently been made at the Watertown Arsenal some tests of the adhesive resistance of different kinds of nails in wood that seem to be of more than ordinary interest to the users of nails, so we print a summary of them below. The nails used were plain wire nails, cut nails, and a wire nail exactly the same as the plain wire nail, but coated with pure refined Trinidad asphalt under Copeland's patent. The cut and plain wire nails were all of standard makes. In all of these tests the nails were driven perpendicular to the grain of the wood, and but one stick of each kind of wood was used, and in all but the white oak the nails were driven to within one-fourth inch of the head. In the white oak the nails were driven about one and three-quarter inches. All of the cut nails were driven with their tapering sides acting lengthwise the grain of the wood. In figuring the surface, no account was taken of the taper at the points of the wire nails. Four nails of each kind and size were tested in all but two or three instances, and the averages are the figures given below.

Kind of Wood.	Specific Gravity.	Kind of Nail.	Size.	No. Nails to the lb.	lbs. to pull nail out.	lbs. per square inch of surface in Wood.	lbs. to pull out after being drawn ¼ in.
W. Pine	4418	Plain Wire.	4d	394	89	238	
"	"	Cut.........	4d	252	128	278	
"	"	Coated "	4d	388	265	914	
W. Pine	"	Plain Wire.	6d	274	142	335	
"	"	Cut.........	6d	142	284	425	
"	"	Coated "	6d	271	312	763	
W. Pine	"	Plain Wire.	8d	128	227	304	
"	"	Cut.........	8d	86	581	518	
"	"	Coated "	8d	126	506	677	
W. Pine	"	Plain Wire.	10d	88	259	258	
"	"	Cut.........	10d	59	648	407	
"	"	Coated "	10d	87	641	638	
W. Pine	"	Plain Wire.	20d	35	526	281	338
"	"	Cut.........	20d	31	957	405	518
"	"	Coated "	20d	35	1181	631	1016
W. Pine	"	Plain Wire.	60d	13	1077	264	
"	"	Cut.........	60d	10	2025	350	
"	"	Coated "	60d	13	1900	465	
Spruce	4384	Plain Wire.	10d	88	368	366	204
"	"	Cut.........	10d	59	652	410	307
"	"	Coated "	10d	87	657	654	511
W. Oak	6255	Plain Wire.	20d	35	760	804	
"	"	Cut.........	20d	31	1000	925	
"	"	Coated "	20d	35	999	1054	

The average resistance in pine per square inch of surface was 667 pounds for the coated nail, 398 pounds for the cut nail, and 280 pounds for the plain wire nail. It will be noticed that the resistance per square inch does not differ very materially with the different sizes of cut and plain wire nails, but with the coated nail it is much higher in the smaller sizes. This is owing to their having much greater surface in proportion to their mass than the larger sizes and so are heated to a higher degree of temperature by driving, thus cementing them more firmly into the wood. The very slight loss from starting as compared with the other nails is accounted for in the same way: In starting the nail, the cement is fractured, which generates heat and softens it, and so as soon as the nail is at rest again, the cement unites as before. The average loss in holding-power of the nails that were started one-fourth inch was seventeen per cent for the coated nail, thirty-seven per cent for the plain wire nail and fifty-two per cent for the cut nail. If the cut nails had been driven with the taper of their sides acting across the grain of the wood they would have given a somewhat higher resistance to being started, but they would have suffered much greater loss from being started.

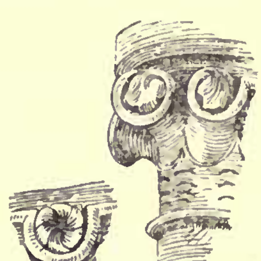
The average variation between the lowest and the highest result in each test was twenty-four per cent for the coated nail, twenty-nine per cent for the plain wire nail, and thirty-three per cent for the cut

nail. This variation was probably caused by slight inequalities in the wood, but is of value, showing to what degree the nails are effected by the varying density of the wood even in the same stick.

To illustrate the effect of the different nails on the wood, we print two cuts, which show very clearly the displacement of the fibres caused by driving the nail. The wood used was Michigan pine and the nails were ten-penny standard and were driven into the edge of a plank and the block then sawed off and split by driving in a chisel along the edge. A study of these blocks would lead one to the conclusion that a test of the nails after they had been driven some time or exposed to the action of the weather would be more favorable to the wire nail. We believe that no such test of the wire nail has ever been made, so we have no definite figures to judge from.

LONDON NOTES.

LONDON, January 16, 1888.



CAPITAL FROM DEERHURST CHURCH.

PUBLIC attention has been rudely called to the necessity of doing something to make theatres less dangerous by the two terribly destructive fires which have recently taken place at the Grand Theatre, London, and the Theatre Royal, Bolton. Fortunately — most fortunately — the fires at both these theatres occurred at times when there was no performance and thus we are spared the horrors that followed the Exeter calamity. I hear, however, that theatre-managers are experiencing a very marked diminution of their profits, which, at this festive season of the year, should be considerable. Let us hope that this attack on their pockets will make them devote a little more care to the safety of the lives of their patrons than they have been wont to do, for after all it is the theatre managers and lessees, not the architects, who are mainly responsible for the present lamentable state of affairs. Indeed, I am informed by an eminent theatrical architect in London that he has to bring considerable pressure to bear upon his clients to persuade them to adopt even the most elementary precautions.

One noteworthy result of the Grand Theatre fire has been the remarkable proofs that have been adduced of the trustworthy character of concrete as a fire-resisting material. For example, the iron girder over the proscenium-arch is encased with some inches of concrete, and though it was evidently exposed to the hottest flames, it stands erect among the ruins — an eloquent argument in favor of more general employment of this material in public and in private buildings. The uncased girders have, as usual, twisted and contorted in the most grotesque manner. The plans for both new buildings are being prepared by Mr. Frank Matcham, who has had a considerable experience in this particular branch of the profession. Mr. Matcham expresses his intention of lighting the theatres entirely by electricity and this seems to me to remove one of the chief causes of danger, notwithstanding the fact that it is scoffed at by a gentleman whose experience should enable him to speak authoritatively. I refer to Mr. Augustus Harris of Drury Lane.

"A Century of British Art," is the somewhat ambitious title of this winter's exhibition at the Grosvenor Gallery. I was a little

curious to see what would be the effect of the recent split in the management upon the character of the Exhibition, but I must say that Sir Coutts Lindsay has succeeded in gathering together a very creditable collection. The period selected is from 1737 to 1837, and most of the principal artists who flourished during that century are represented. Whether all the drawings that are exhibited are worthy of the honor conferred upon them, or whether some well-known artists, such as Gainsborough and Reynolds, for instance, have been quite fairly treated, is, I think, an open question, but it must be remembered that Sir Coutts Lindsay's task was no easy one. Hogarth is strongly represented, and for those who like his pictures, the collection will doubtless prove of great interest. One extremely quaint sketch entitled "The Sleeping Congregation," is a capital satire upon the religious worship of our forefathers. Another of a totally different character, "The Lady's Last Stake," represents a young and virtuous lady, who, playing at cards with an officer, loses her money, watch and jewels. Her opponent gathering these articles together in his hat proffers them at the price of a greater prize — her virtue and fidelity to her husband. Her hesitation forms the subject of the picture.

Of the other artists, Constable, with his singular treatment of skies; Turner, with his delightfully dreamy landscapes, full of rich subdued light; Morland, Mulready, Crome, the elder, and Wilkie, are all more or less fairly represented. One of Wilkie's pictures particularly took my fancy: it was called "The Letter of Introduction," and the attitude of the old gentleman, who, sitting at his escritorie, deliberately opens the missive while carefully stud ying the looks and attitude of his simple but dignified guest, is charming in the extreme; and the delicate modelling of the Japanese jar in the foreground is beyond all praise. Altogether, although the exhibition is, in a sense, both incomplete and too complete, yet, Sir Coutts Lindsay deserves our warmest congratulations upon the result of his labors.

I have not yet been to the Academy Exhibition of the works of Deceased British Artists, but from what I hear it is hardly up to its usual standard.

"Brasses" formed the subject of a lecture at the Architectural Association the other night, by a well-known amateur rubber, M. A. Oliver. The collection of rubbings was one of the finest I have ever seen, and it certainly gave the room a weird appearance to be surrounded on all sides by life-sized figures of grim knights in armor and stern ecclesiastics frowning down upon us. The room was fairly full, and the audience very enthusiastic.

A Travelling Studentship of £100 which has been established by the British School of Athens, in conjunction with the President of the Royal Institute of British Architects, for the purpose of research into the architecture of the ancient Greeks, has just been won by Mr. R. Elsey Smith, son of Professor Roger Smith, the well-known and justly esteemed Professor of Architecture at University College, London. Mr. S. R. Greenshale has also won a prize of £20 for measured drawings offered by Colonel Edis.

Nothing further has yet been done about the Board of Works scandal.

Chiel.

THE MEXICAN LAUNDRY.

Capital from Deerhurst Church

THERE are some things connected with the architectural economy of Mexico that are worthy of imitation by Americans, but it cannot be said that the public laundries are among them. They are, however, quite curious, and a sketch of them may prove interesting if not instructive. They are a feature of every Mexican town. Throughout the republic every running stream is converted into a laundry and every day is "wash-day." The women "gather at the river," bearing great bundles of clothing and selecting large, flat stones for washboards, and using the roots of a kind of cactus for soap, wash out the various garments (rubbing them with such vigor upon the flat stones as to remove every particle of dirt and parts of the garments also), and then hang them upon the bushes to dry. Sometimes they wear the clothing to be washed down to the river and "kill time" while it is drying by taking a bath. Thus there are favored spots upon the river banks in the outskirts of every town and village which present a gay scene from sunrise to sunset every day in the week, Sunday not excepted.

Down in that part of the country where lava abounds, and especially in the neighborhood of the city of Mexico, the municipal or other authorities have been at some pains to provide special places where the poorer classes can do their washing. What part lava has to play in this benevolence on the part of Mexican rulers is easily explained: lava enters largely into the construction of such a laundry in addition to the other uses made of it in the localities where it is to be found. Pedregal, which means "a stony place," is an immense lava bed lying near the famous battlefield of Churubusco, and has itself a name and place in the history of the Mexican War. It furnishes an immense quantity of lava, which can be hewn into any shape without difficulty, and is consequently in great demand for paving-stones and for *metates* — the stones upon which the women grind corn. It is very dark colored and contains innumerable cavities of every size, showing where air has been confined as the molten mass has flowed down the mountain sides and spread over the plain. In times past the lava beds of Pedregal must have been largely drawn upon for the construction of a large number of laundries which I have seen in the City of Mexico and in neighboring cities.

These laundries consist of from fifty to a hundred rectangular troughs of lava placed side by side on both sides of a narrow reservoir. Each trough is about three feet long by half that width, and probably two feet thick, though it usually stands but a foot or so out of the water. It is scooped out to the depth of two or three inches only. Being placed obliquely to the water, the water-line is a regular zig-zag. These troughs may have been originally designed to hold the allowance of water for each laundress, but they are now used as washboards, and the surface of a lava block being far from smooth, owing to the numerous air-cells mentioned above, clothing which passes through the hands of one of these laundresses does not last long. It is buttonless after the first washing and hangs in shreds after the second or third.

The scenes at one of these public laundries are very picturesque and would delight the soul of any artist with a *penchant* for peasant life. The women work hard, pausing now and then to gossip with their neighbors, and their children play around until the washing is done and are carried home in the wooden "dug outs," which are a part of every Mexican's household outfit. Strange as it may seem, there are seldom any quarrels among the women at these laundries.

When these laundries were first instituted I have never found any records to show. They must be very old, for they were built at a time when more regard was paid to the needs of the poorer classes in Mexico than at present.

Arthur Howard Noll.

SOCIETIES

WESTERN PENNSYLVANIA ASSOCIATION OF ARCHITECTS.

AT the Annual Meeting of the W. P. A. A., the following officers were elected. President, Andrew Peebles; Vice-President, Geo. S. Orth; Secretary, L. O. Dause, C. E.; Treasurer, Jos. Anglin; Directors, Thos. M. Boyd, C. E., Jos. Stillburg, T. D. Evans. (Certified,) L. O. Dause, Secretary.

What might have Become of the Bastile.—The king who hesitates is very often lost, just as much as though he were an ordinary mortal. A very interesting discovery of recent date shows that if Louis XVI had only been a little less dilatory he might have prevented the taking of the Bastile, and possibly changed the course of history. It is now clearly proved that early in 1788 he had given his conditional approval to a plan for demolishing the Bastile and for laying out the site as a garden; and a plan was actually prepared showing how the proposed change could be effected, but the king, unfortunately for himself, did not at once approve this plan when it was placed before him. He said he would think about it, and while he was thinking, other and more stirring events followed, till presently, on July 14, 1789, the Parisians, tired of waiting for the king's consent, pulled down the Bastile on their own account. The original plan for laying out the site as a public garden is still in existence, and may be seen by the curious among the historical treasures at the National Library at Paris. — *London Figaro.*

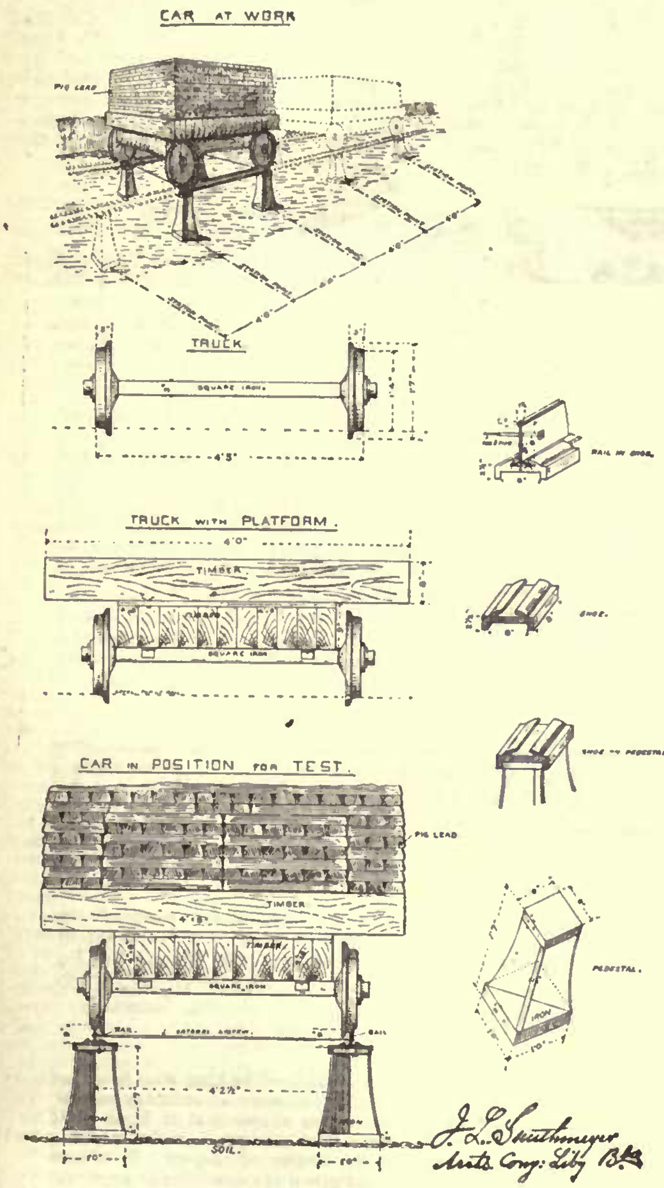
COMMUNICATIONS

TESTING FOR THE FOUNDATIONS OF THE CONGRESSIONAL LIBRARY.

OFFICE OF THE ARCHITECT OF THE CONGRESSIONAL LIBRARY BUILDING, 145 EAST CAPITOL STREET,
WASHINGTON, D. C., January 19, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,—My attention has been called to a communication in your valued journal of January 7, headed "A Faulty Ground-testing Apparatus," accompanied by an illustration. Permit me to say that both the illustration and the writer's deductions are extremely inaccurate, and would indicate that his visit "between trains" to the Library site must have been a very hasty one. The sketch was evidently not made on the spot, but subsequently from the vague impressions received. The apparatus of which I send you drawings, consists of a set of cast-iron pedestals, exactly twelve inches square on the base, which are placed four feet apart from centres. Over these pedestals, and fitting into shoes placed on the pedestals, there rest two rolled iron deck-beams. The weight (pig-lead) rests on a car built of four cast-iron flanged wheels with wrought-iron axles, which carry a timber platform in the manner shown on the drawings. The lowest foundation courses of the Library have been designed to sustain, from the superincumbent weights of all descriptions, a uniformly distributed load of two-and-one-half tons per square foot; the test-load applied to the apparatus being double that amount, or five tons per square foot. The car which is placed precisely over four of the



pedestals is loaded with twenty tons of pig-lead, and after a record has been taken of its effect upon the ground, is shifted on to the next four pedestals which have been established in line with the former, and the operation is then repeated. Accurate levels are obtained with a levelling instrument, care being taken to have the four pedestals on a level at the start, and disconnected from any others for the time being.

Now, it will be apparent that with this method a *practical* result is achieved, which, under the circumstances, is very satisfactory. The ground under the proposed Congressional Library Building is of a fine sand mixed with particles of clay, which would, under ordinary conditions, be accepted as a first-class substratum to build upon. In this case, however, it was considered advisable to use more than ordinary caution in the preparations for the foundations of this structure, and the simple and inexpensive plan illustrated herewith was devised for the purpose. On the other hand, it would have been injudicious to overshoot the mark by complicating the apparatus for the purpose of obtaining mathematically accurate results, the benefit of which would be lost in the practical execution of the work. It is known to every experienced architect or engineer that in most cases where practical results are to be obtained, the subtleties of scientific tests and nice mathematical calculations are engulfed in the "factor-of-safety," and this especially so with such materials as sand and clay which are influenced by all kinds of atmospheric conditions.

The use of a travelling car was chosen for its ease of transportation. If, as Mr. Arey suggests, the load were piled upon single pedestals, it would require a large force of men, and a great deal of time to load and unload the lead, and to handle and transport the lead in bulk would again require staging and other apparatus. As constructed, the loaded car is satisfactory. Indications are given in the excavation trenches of any weak spots, and the results obtained show that the apparatus is perfectly sensitive. The minimum compression so far as has been proceeded with, was less than one-eighth inch per square foot, and the maximum one-and-one-half inch, all in a trench one hundred and eighty feet long, and, with one exception no spot has been discovered which would justify the use of any extraordinary means of strengthening the foundations by spreading or deepening, as the concre[te be]d will be strong enough to bridge the slight inequalities thus far discovered and noted. In isolated pier-pits, the single pedestal mentioned by Mr. Arey had to be used as there was not room enough to run the car. In these instances the load had to be steadied and braced latterly to keep it from tumbling over. From a strictly theoretical point of view this would also obviously affect the correct result, but for the practical point in question it was considered sufficient evidence of good ground when the load of five tons on the single pedestal left no impression deeper than one-eighth of an inch. Together with the drawings I enclose a schedule of the results obtained with the apparatus.

STATEMENT "A" OF THE RESULTS IN TESTING THE SOIL WITH A WEIGHT OF 5 TONS PER SQUARE FOOT, FROM OCT. 25, UP TO NOV. 11, 1887, INCLUSIVE.

Number of Pedestal.	Settlement in inches. West. Pedestal.	Settlement in inches. East. Pedestal.	Remarks.	Number of Pedestal.	Settlement in inches. West. Pedestal.	Settlement in inches. East. Pedestal.	Remarks.
1	[illegible]	[illegible]		31	1½	[illegible]	Fine dry Sand.
2	[illegible]	[illegible]		32	1¼	[illegible]	
4	[illegible]	[illegible]		33	[illegible]	1¼	
5	[illegible]	[illegible]		34	[illegible]	[illegible]	
6	[illegible]	[illegible]		35	[illegible]	[illegible]	
7	[illegible]	[illegible]		36	[illegible]	[illegible]	
8	[illegible]	[illegible]		37	[illegible]	[illegible]	
9	[illegible]	[illegible]		38	[illegible]	[illegible]	
10	[illegible]	[illegible]		39	[illegible]	[illegible]	
11	[illegible]	[illegible]		40	[illegible]	[illegible]	After rain.
12	[illegible]	[illegible]		41	[illegible]	[illegible]	
13	[illegible]	[illegible]		42	1	[illegible]	After rain.
14	[illegible]	[illegible]		43	[illegible]	[illegible]	
15	[illegible]	[illegible]		44	3-16	3-16	
17	[illegible]	[illegible]		45	[illegible]	[illegible]	
18	[illegible]	[illegible]	After rain.	Pier 1	[illegible]		
19	[illegible]	[illegible]		" 2	[illegible]		
20	none	none		" 3	[illegible]		
21	¼	[illegible]		" 4	[illegible]		
22	[illegible]	[illegible]		" 5	[illegible]		
23	none	none		" 6	3-16		
24	¼	[illegible]		" 7	[illegible]		
27	none	none		" 8	[illegible]		
28	[illegible]	¼		Maximum = 1½ in.			Minimum = ⅛ in.
29	[illegible]						
30	1	[illegible]	Fine dry sand.	Av'r'ge = 8-32 in. in 53 tests, 185 ft. space.			

In conclusion I wish to extend a cordial invitation to the members of my own and the related engineer profession to drop in upon me "between trains," my office being on the Library site, where I shall be happy to extend any facilities in my power to examine the drawings, the work and everything else of interest in the construction of the Congressional Library Building.

Very respectfully yours,

J. L. SMITHMEYER,
Architect Congressional Library Building.

HARDING'S BOOKS ON DRAWING.

TORONTO, Jan. 26, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,—In your issue for October 25, 1884, you recommend to a correspondent J. D. Harding's "*Principles and Practices of Art*" for architectural picture-making. I have before me a list of books in which I find Harding's "*Lessons on Art*, 140 Progressive Lessons on Drawing" 1849, small folio, would this be the work to which you referred? An answer would much oblige,

Yours truly, A DRAUGHTSMAN.

[No. The books mentioned are distinct works by the same author.—EDS. AMERICAN ARCHITECT.]

IRON CHURCHES.

Boston, Jan. 28, 1888.

To the Editors of the American Architect: —

Dear Sirs, — Mr. Lawrence B. Valk, Architect, Tribune Building, New York, can probably give information as to the builders of iron churches in this country.
C.

[Another correspondent reminds us that Mr. Ruskin wrote a year or so ago to a church committee to the effect that "of all manner of churches thus idiotically built, iron churches are damnablest to me." — Eds. Am. Architect.]

PLASTER BOARDING.

East Los Angeles, California, Dec. 29, 1887.

To the Editors of the American Architect: —

Dear Sirs, — Could you kindly give me any information regarding a material called plaster boarding. I am desirous of knowing where it is manufactured and how used. I enclose stamp for reply.

Yours etc., Wm. A. Potts.

NOTES AND CLIPPINGS

Ruskin's New Attitude about "Finish." — There is a little book, and a very precious and pretty one, of Dr. John Brown's, called "*Something About a Well.*" It has a yellow paper cover, and on the cover a careful wood-cut from one of the doctor's own pen-sketches — two wire-haired terriers begging, and carrying an old hat between them. There is certainly not more than five minutes' work, if that, in the original sketch; but the quantity of dog-life in those two beasts — the hill-weather that they have roughed through together, the wild fidelity of their wistful hearts, the pitiful irresistible mendicancy of their eyes and paws — fills me with new wonder and love every time the little book falls out of any of the cherished heaps in my study. No one has pleaded more for finish than I in past time, or oftener or perhaps so strongly asserted the first principle of Leonardo, that a good picture should look like a mirror of the thing itself. But now that everybody can m rror the thing itself — at least the black-and-white of it — as easily as he takes his hat off, and then engrave the photograph, and steel the copper, and print piles and piles of the thing by steam, all as good as the first half-dozen proofs used to be, I begin to wish for a little less to look at, and would, for my own part, gladly exchange my tricks of stippling and tinting for the good doctor's gift of drawing two wire-haired terriers with a wink. And truly, putting all likings for old fashions out of the way, it remains certain that in a given time and with simple means, a man of imaginative power can do more, and express more, and excite the fancy of the spectator more, by frank outline than by completed work; and that assuredly there ought to be in all our national art schools an outline class trained to express themselves vigorously and accurately in that manner. Were there no other reason for such lessoning, it is a sufficient one that there are modes of genius which becomes richly productive in that restricted manner, and yet by no training could be raised into the excellence of painting. Neither Bewick nor Cruikshank in England, nor Retsch, nor Ludwig Richter in Germany, could ever have become painters; their countrymen owe more to their unassuming instinct of invention than to the most exalted efforts of their historical schools. — *John Ruskin, in the Magazine of Art.*

Disappearance of a French Picture in America. — A curious reminiscence of the ill-fated Crystal Palace Exhibition of New York of 1853 is brought up by a memorial received here from M. Antoine Etex, the distinguished French sculptor, architect and painter. M. Etex states that, filled with admiration for the institutions of the United States, he executed a large historical painting, "To the Glory of the United States," in which he depicted Washington, Franklin and other heroes of the Revolution, many of the faces being copied from authentic portraits in the possession of descendants of Lafayette, the background being filled by portraits of all the Presidents of the United States down to 1855, and the whole surmounted by the Ægis of the Goddess of Liberty. He was persuaded by a German named Buschek to send this work for exhibition to the New York Crystal Palace. Horace Vernet and a number of other eminent French artists were in like manner persuaded to forward works for exhibition, it being expressly stipulated that all the contributions should be safely returned without cost. In 1855 an alarming rumor reached him that all the works of art exhibited at the Crystal Palace had been seized and would be sold for the benefit of the creditors of the affair. He determined to come to the United States and take measures to protect his own property and that of his fellow-artists. The Emperor Napoleon, notwithstanding M. Etex's known republican sentimen s and the part he had played in the revolution of 1848, sent his private secretary, M. Moequart, to him with 5,000 francs in an envelope, which he accepted as a loan to defray the expenses of the trip. He landed in New York, and, to his joy, found his work as well as those of his Parisian *confrères* still intact, and succeeded in removing them from the Crystal Palace building before the disastrous fire which subsequently destroyed it. At the request of Mayor Wood, M. Etex's painting was taken to the City Hall and there exhibited on the 4th of July, 1855. M. Etex came to Washington, was presented to President Pierce, and was entertained at the White House. He made a bust of President Pierce, two medallions of Mr. Cushing, one each of Mrs. Fremont and her father and Senator Benton. He also executed a portrait of Mrs. Fremont and a bust of Fernando Wood, for all of which he declined to receive any compensation, being led to believe that his picture would be bought by the Government for 200,000 francs — whether by the general Government or by the city of New York his memorial does not distinctly show. The war of secession came on before anything was done, and now, at eighty-one years of age, M. Etex, through leading European bankers, writes to ask what has become of the 200,000 francs for which he has been waiting over thirty years. The records of Congress and the departments here fail to disclose that any effort was ever made to secure an appropriation for this purpose. A more difficult question to answer is, what has become of the picture itself? A large and valuable historical painting of this character by an artist of more than national reputation can scarcely have passed into oblivion. But where is it? — *New York Evening Post.*

The Tomb of Daniel. — Sir Henry Layard thus describes the so-called tomb of Daniel: "The vast mound which marks the site of the ancient city of Susa, the capital of Susiana and Elymais, was visible in the distance, and as we drew near it appeared to me to be little inferior in size to the Mujelibi, the principal ruin of Babylon. We rode first to the tomb — the principal object of my visit. I found it to be a building of comparatively modern date, resembling the Imaum-Zadehs, or tombs and shrines of Mussulman saints constantly met with in Khuzistan, surmounted by a high conical dome of irregular brickwork — somewhat resembling in shape a pine-cone. I entered through a gate into a court, in which pilgrims find a resting place for the night, safe from wild beasts and Arab thieves. A dark inner-chamber, opening upon an outer-room, contained the so-called tomb — a square case of plaster which might be supposed either to cover a grave or to enclose a coffin. Above it were suspended some ostrich eggs and lamps. The tomb was surrounded by a wooden trellis. In the outer-chamber I observed one or two small capitals of columns in marble, and in the court-yard a larger one of the same material, with a kind of lotus-leaf ornament, one foot ten inches in height. They were of the early Persian or Persepolitan period. The building, surrounded by a few konar trees and palms, stands on the bank of a small sluggish stream, called by the Arabs the Shaour, which rises in the plain not far from the ruins. I found the remains of a flight of steps, built of large dressed-stones, leading down to the water's edge. Among them was a slab, with a bas-relief, which has been described as a man between two lions, and has been converted by a lively imagination into Daniel in the lions' den. There had formerly been preserved within the tomb a black stone, or slab, said to have been covered with mystical signs and human figures. The dervish informed me that it had been broken into pieces by two Arabs, as they believed that it contained gold."

TRADE SURVEYS

The usual weekly summary of trade shows results that are calculated to increase confidence in future developments in trade and manufacturing. The percentages are safe, the gross and net earnings are all right, the statistical summaries read right. The country is producing and absorbing fully up to all anticipations. Those who a month or two ago shouted "Look out!" are quiet now. Under the abundance of money and the anxiety of buyers of bonds to purchase and of investors to invest, there is an eagerness and impatience in the markets to put out money in a safe way. Investments rather than speculations are sought after. Commercial reviews and manufacturing summaries show activity in traffic and trade channels and this indicates that the consumption of products of all kinds has not been retarded. In fact, an expansion of consumptive demand is probable in building and most kinds of railway material. Numerous brick contracts now run into midsummer. So do railroad-equipment contracts, but not contracts for rails, although last week one hundred thousand tons of rails were ordered There is an abundance of money seeking investment. Builders have been employed in many Western cities to erect dwellings in large numbers to be sold when completed. Lumber manufacturers both West and South are entering into contracts for next season's deliveries. There will be extensive developments of hardwood interests. Everything points to a gradually-increasing control over the lumber supply, but it will never approach the degree of control exercised over oil, coal or many other raw products Both timber and minerals are passing under the control of fewer hands but the practical results will be comparatively harmless for the next few years. The iron and steel makers look anxiously for an improving demand from somewhere to offset the anticipated falling off in the railroad-building demand. The coal production has reached one hundred and ten million tons and possibly one hundred and fifteen million tons. The idleness of two-thirds of the anthracite region has not diminished the supply a ton, in fact, the weekly output is nearly one hundred thousand tons greater than a year ago. Machine-shop work is abundant. Electricians complain of a temporary falling off in orders. Hardware manufacturers are combining to regulate prices. Textile manufacturers are aroused to protect threatened interests at Washington. Cotton is strong. Wool is weak. Foreign textile-goods' competition is seriously felt in two or three branches, but withal there is a steady expansion of capacity. All kinds of machinery and tool makers are busy, but late advices from implement manufacturers show dulness. Shop work west of the Mississippi is plenty. East of the Hudson it is lighter than late last year. Most repairs and extensions in factories and mills have been completed. The anthracite coal-strike will probably continue a month yet and do harm. The miners will be encouraged to hold out by delusive prospects of State or national inquiry. No actual harm has been done and prices will rule stronger in all markets for the next six months than they would have done but for the strike. The financial situation is strong, but a corner in money is more probable than for two or three years because of the extraordinary expenditures of the past two or three years. No scarcity is immediately probable, but those who will hold on to their money will increase in number until some more satisfactory banking basis for the people is devised by Congress. The productive capacity of the country has been too greatly enlarged to justify the fears expressed by some otherwise sensible financial authorities as to over-production. This nightmare does not threaten the American people, nor does a money stringency, nor even are its fiscal or protective policies really endangered. The cards are being shuffled at Washington by expert hands, and the political Ah-Sins for the let-well-enough-alone policy will be equal to the occasion when the national game is played.

S. J. Parkhill & Co., Printers, Boston.

THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. XXIII. | No. 633.

Copyright, 1888, by TICKNOR & COMPANY, Boston, Mass.

FEBRUARY 11, 1888.

Entered at the Post-Office at Boston as second-class matter.

CONTENTS

THE Italian Government has taken a step which was long ago suggested, as a retaliation for the American imposition of a duty upon works of art. Scores of clever artists in Italy have lived for many years on the proceeds of the pictures, copies or originals, which they sold to American visitors. These were naturally their best customers, as Americans have no such opportunity as is enjoyed by the citizens of other countries for seeing great paintings in the original, and are glad to get good copies; and the suppression of the business by the infliction of a heavy duty is said to have caused a good deal of distress to very worthy people. An urgent appeal was made a year or more ago to the Italian Government to impose an export duty on works of art, in return for the American import duty, but it seems to have reflected that this would not help the Italian painters, and has taken the more sensible, as well as less violent course of laying a tax on exports of antique objects of art. At present, antiquities are admitted to the United States free of duty, as representing an industry which obviously does not need protection, and an immense number of them are annually imported by tourists and dealers in bric-à-brac. The Italian Government, therefore, desiring to relieve its living artists by handicapping their antique competitors, has voted to impose an export duty of twenty per cent upon all works of antique art, which can henceforth only be removed from the country by declaring their value, paying the duty, and going through the usual vexatious custom-house formalities. Moreover, to avoid undervaluation of a class of objects which have no definite market price, the Italian Government expressly reserves the right to appropriate on the spot any article of the kind which it finds in possession of a traveller or dealer, on paying him the sum which he mentions in his declaration as the cost. Although this new law is likely to bring in a considerable sum to the Italian Treasury, it is sure to be felt as an intolerable annoyance to travellers, who will have to submit to long searches, and may very possibly be required to pay duty on objects purchased outside of Italy, and simply brought through the country, since it would be virtually impracticable to distinguish between coins or bronzes bought in Venice and those which came from Trieste or Munich. We cannot say that we are extremely sorry to have American tourists, who allowed their representatives to vote for their own law without energetic protest, made to realize how much trouble may be caused by ill-considered statutes, without any corresponding good to any one, but it is a misfortune for every one outside of Italy, except, perhaps, the Swiss and English manufacturers of sham antiques, that a check should be put upon the distribution of the unrivalled works of antiquity among those who have education enough to appreciate them.

M. REMAURY writes to *Le Génie Civil* a letter on the subject of the recent rise in the price of copper, which is interesting, and shows, as often happens in such cases, that the movement might easily have been anticipated if those in a position to know the state of the market had taken the trouble to reflect upon the inevitable consequences of its condition. According to the letter, the production of copper has not greatly varied for several years, the total for the world having been two hundred and twenty thousand tons in 1884, two hundred and twenty-six thousand in 1885, and two hundred and sixteen thousand in 1886. The price, however, has changed greatly. To say nothing of the enormous prices of ten years ago, the average market-value of copper in 1884 was about twenty-two per cent, and in 1885 about six per cent higher than in 1886. Even in 1884, the low price of the metal had been severely felt at the mines, and 1885 found several of the smaller ones closed, on account of unsatisfactory conditions of the market, while the owners of the others were complaining loudly of their condition. The effect of this was shown in the diminished production of 1886, yet, although a loss of five per cent in the output of an article, the consumption of which is usually so closely adapted to the supply, was obviously a serious matter for consumers, the price continued to fall during 1886. This set up an abnormal condition of the market. With such a desirable material as copper, any fall in price leads to an increase of consumption, since every one is ready to substitute copper for iron as soon as it is economical to do so, and in 1886 the price was falling, the consumption increasing, and the production materially diminishing. It could only be a question of a few months when the reaction would occur, and the demand again be equalized with the supply by an advance in price, yet so slow were dealers to perceive this that during 1887 the stock of copper on hand, through the excess of demand over the supply, fell at the rate of fifteen hundred tons a month, until, on the fifteenth of last December, the total stock of Chilian and Australian copper in England and France fell to forty-four thousand tons, or less than four months' supply. At this very moment the fire occurred in the Calumet and Hecla mine, burning out the galleries, and effectually closing for a year, at least, as the best judges considered, a source from which came thirty thousand tons a year, or about one-seventh of the whole production of the world; and the now famous French syndicate thought that the time had arrived for a turn in the market. One of the principal members of the syndicate was the Société Industrielle et Commerciale des Métaux, which consumes regularly in its own factories twenty-five thousand tons of copper a year, and would thus be quite justified in buying a year's supply for its own purposes, without regard to any profits to be made by selling again; but it was not unnatural, in view of the situation of the market, to do more than this, and secure the whole stock in Europe, advancing the price afterward, as the syndicate has done, to exactly double the market rate of December, 1886. Of course, the rise in value will set at work the smaller mines and the supply will again increase, but meanwhile the syndicate will have pocketed its profits as the reward of an intelligent study of the conditions of the business for a suitable period.

THE *Scientific American* mentions something which is worth remembering by those who have iron roofs or floors to take care of, and which it finds in an article in the *Engineer*, describing the precautions taken to protect iron and steel ships. According to the *Engineer*, the corrosive action which takes place in metal ships, and which forms the principal source of their deterioration, cannot be entirely arrested by any practical process. Painting, either with lead or iron pigments or the black paraffine varnish, is found to be of little, if any use, the rust going on under the paint quite as fast as on an unprotected surface, especially on the inner surface of the hull, where the wash of the bilge-water, the rolling of lumps of coal and other hard objects, and the careless stowing of the cargo, scratch or detach the coating in places, and set up centres of oxidation. In fact, the covering of paint seems to hasten corrosion, and it is found that the portions of iron decks around the hatchways, where the paint is immediately worn off, lose less by rust than the undisturbed portions near the bulwarks, as is easily shown by the greater thickness, after years of use, of the plates around the hatches. At one time asphalt was much used to protect the inner surfaces of the ship, but at certain

times, and in certain portions of the vessel, the temperature is high enough to soften the asphalt, which runs to the lowest points, leaving the others bare. Then Portland cement was employed, plastered on the iron in layers from one to six inches thick, and often mixed with broken bricks or tiles, or some similar "aggregate," in the thicker portions. This was, and still is, an excellent practice, but in modern ships every inch is of importance, and Portland cement concrete, unless put on in a tolerably thick layer, is apt to scale off, although it is often used simply as a wash. A still better application, however, is found in a combination of Portland cement and pine tar. The surfaces to be treated must be dry and clean and free from rust. The tar is then put on in a good coat and sprinkled with dry Portland cement in fine powder until as much has been put on as will adhere. The cement absorbs the tar and slowly sets, forming a hard and waterproof skin. It seems not unlikely that the same treatment might with advantage be applied to iron roofs. An ordinary corrugated iron roof is a very short-lived affair, and painting does not greatly improve it, but a tar and cement coating, which in most cases need only be applied outside, since the inside would usually be dry, would not be expensive, and ought to be far more effective than paint.

ACCORDING to the *Builder*, the Municipal Council of Rome has recently passed an ordinance which is likely to be of some indirect benefit to architects. For some years it has been the rule that applications for permits to build in Rome must contain the name of some architect who should be held responsible for the proper planning and construction of the work. The Building Law of New York contains the same requirement, and it was found in Rome, just as it is in New York, that the "architect" named in the application for a permit is in many cases a mere figure-head, being very often a clerk or an ingenious journeyman in the employ of a builder, who is sometimes glad of the opportunity which the law gives him for shifting on the shoulders of such irresponsible persons the liability which ought properly to rest upon himself. With a view to the prevention of this abuse, which may easily have serious consequences, the Roman city government issued a notice that, with a view to the protection of the public, it will henceforth accept as architects in connection with building permits only those persons whose names shall have been registered by a Commission appointed for the purpose as being qualified for the practice of the profession of architecture. Of course, all the persons who wished to practice this profession in Rome immediately applied to the Commission for registration, and, according to its report, one hundred and twenty-five, out of one hundred and sixty-six candidates, were accepted as possessing the necessary qualifications. These, according to the *Builder*, comprise a diploma in physics and mathematics from the University of Rome or that of Bologna, besides a certificate of three years' attendance at a technical school, and a course of instruction in a school of art, so that the standard of theoretical training among the Italian architects would appear to be very high.

A GOOD deal is said just now about a new light, the so-called "lucigen," which has been brought into use in several of the English railway stations, and has proved very successful and very cheap. The principle of it is simple enough, oil of creosote, a cheap coal-tar product, being blown in spray into the lamp by a jet of compressed air, and allowed to burn in the jet of air; but the effect is remarkable. Naturally, it is most economical to employ it on a large scale, a powerful jet, carrying a considerable amount of spray, requiring little more power or machinery than a small one, so that it is employed for lighting railway-stations in large lamps, each having an illuminating power of three thousand candles. This is about equivalent to six ordinary electric-arc lights, but the lucigen has the advantage over the arc light that its flame is much larger. While a lucigen lamp throws out six times as much light as a common arc-light, it presents a luminous surface three hundred and fifty times greater, and this is found to assist very much in that diffusion of the light which is so necessary to good artificial illumination, and which is so difficult to obtain with arc-lights.

THE Parisians, who, as we all know, are very old-fashioned in their notions, have just finished a splendid building and now desire to have it decorated. Acting in accordance with that slavish subjection to tradition which characterizes, we will not say the subjects of monarchies, but the effete inhabitants of the old world, they have not been able to think of any better way of having this done than by getting the best decorators to do it, and the only question which has occurred to their paralyzed intellects was that of determining who the best decorators might be. With this idea they, or their representatives, the Municipal Council, have appointed a commission of experts, comprising twelve members of the Council, four architects, three sculptors, and several critics, which, under the presidency of the Prefect of the Seine, is to make choice of the artists most worthy to embellish the town-hall of the great city. Obviously, such a commission, if the opinions of its members were worth anything, would hardly be unanimous in its choice, and a certain amount of balloting has been necessary to fix upon certain names, but it seems to be agreed now to recommend the employment of Cabanel for the painting of the ceiling of the Salle des Cariatides, of Puvis de Chavannes and Roll for the decoration of the vestibules leading from this room to the Salle des Fêtes, of Delauney for the grand staircase, of Bonnat, Jules Lefebvre and Besnard for the three reception-rooms facing the Seine, and of Jean-Paul Laurens for the historical pictures which are to adorn the adjoining corner room. All these artists rank among the very best in France, but, in order to give room for the discovery of some genius hitherto unknown, one apartment, called the Prefect's Parlor, which presents a peculiarly favorable opportunity for mural painting, is to be reserved for an artist to be selected in public competition. The scheme, as formed by the Commission, must be sanctioned by the Municipal Council, but there can be little doubt that it will be adopted.

IT will be observed that this plan, although it will make of the Hôtel de Ville the treasury of the masterpieces of the greatest artists of France, has not the merit of great novelty, since most large public buildings in Paris are made interesting in much the same way, but we wish to insist on the fact that such antiquated proceedings are not to be taken as models for the conduct of similar affairs in this free and enlightened country. To use the words of an enthusiastic politician, it is just a hundred years since, by a desperate struggle, we cut loose from all bondage to Old-World ideas, and we must beware of the tempter who would now try to persuade us to return to them. Instead of this laborious way of choosing the persons who are to furnish the objects of art for which the public treasury pays so liberally, the practice consorting most with our unsurpassed institutions appears to be for those who have the care of our public affairs to speak habitually with scorn and contempt of artists and art, to refuse to recognize them as understanding anything about their own business, and to pay no attention to their almost unanimous petitions, but as soon as an attractive widow with a talent for painting, or a pretty girl with long curls and a gift of sculpture, comes along, or a "good feller" of a wandering Italian fresco-painter drifts to Washington, to set them at work disgracing the public buildings with their ridiculous devices at a rate of remuneration which would seem fabulous to a Baudry or Puvis de Chavannes, but which here is said to yield only a moderate income, on account of the enormous percentages levied upon it by the lobbyists and go-betweens who claim to have had a hand in procuring the necessary appropriations. We should be sorry to interfere with the affairs of the well-meaning persons who have hitherto furnished the public art, and it is something to be proud of that not the slightest breath of scandal has ever sullied their relations with the Government, but not even innocent enthusiasm on one side and indulgent prodigality on the other can excuse such freaks as the abandonment of the Rotunda of the Capitol, the central point, as we may say, of the whole United States of America, to the manipulations of a man who can think of nothing better to decorate it with than a band of little figures with big heads and shaky knees, executed in stone color, with painted shadows, to imitate a sculptured bas-relief. We have very little patience with the people who praise everything bad which happens to be American and decry everything good which has been invented abroad, but we have still less with those persons in authority who, in a country which can furnish a St. Gaudens, a Warner or a LaFarge, to say nothing of many others, deliberately turn their backs upon their own fellow-citizens, who, without public aid or countenance of any kind, have raised their country very nearly to the highest rank in the world of art, and call in a foreigner to display the cheap accomplishments of an Italian village whitewasher upon the walls of the principal public room of the principal building of the nation.

BUILDING ACCIDENTS.[1] — V.

Fire-dog. designed by Moreau Frères.

THE "One-horse Shay" claims to be a triumph of logic, but to the writer it appears a triumph of engineering in which the clearly framed specifications were faithfully carried into execution. The statement of the deacon:

> "One thing is plain,
> The weakest part must stan' the strain,"

must certainly be admitted as one of the soundest of engineering opinions.

Although there is so much repetition in the methods of construction and load imposed that a mere regard for precedent would, in most cases, insure the safety of buildings, yet there are numerous instances of failure which are never known to the general public, because those responsible for the matter are naturally averse to any publicity, and generally succeed in avoiding it, unless loss of life or serious personal injuries gives rise to judicial investigation.

It must be an easy task for the brilliant sceptic to lecture upon the mistakes of Moses, because his framework is clearly a matter of record; but the mistakes of the Jack-builders and the rascality of the Buddensieks are kept in a corner as far as the circumstances will admit. A citizen of Pittsfield, Mass., recently deceased, well-known as the largest real-estate owner in the place, and equally well-known on account of his aversion to extravagance, was severely injured by the falling of a staging on one of his buildings. After his return to consciousness, some one by way of consolation told him that two of the men were hurt a great deal worse. "Well," he said, "I think that if we had braced it with just one more lath and two nails, all these suits for damages would have been avoided."

Thoughtless acts on the part of workmen sometimes lead to disastrous results. A well-known instance of a falling mill has been ascribed to fastening a block and tackle to a column, and pulling it out of position while moving some heavy machinery. A few years ago, one of the roof-trusses fell into the hall in Marblehead, Mass., because a piper had cut one of the members nearly in twain, rather than make an offset in his pipe.

There are two classes of accidents to buildings; first, those occasioned by faulty construction; and, secondly, those arising on account of the depreciation of the building or changing of the purposes for which it was originally constructed.

Most of the elements of weakness in buildings are disclosed during construction, because at those times the structure is apt to be subjected to more severe and concentrated loads than will occur after it is finished. It is not unusual to see lumber piled up in building so as to impose a load of two or three hundred pounds to the square foot upon floors which will not afterward be required to sustain a load of over thirty pounds to the square foot. When machinery is being installed in mills, it is generally pressed up together so as to occupy as little floor-room as possible, although by so doing the load per square foot may amount to three times as much as it will when the machines are in position.

Another important circumstance which prevents building accidents from reaching disastrous results, is the warning which timber gives of undue strain, so that breaking can be averted by timely repairs. A number of years ago, Rev. Lorenzo Dow, the celebrated and eccentric itinerant preacher, was announced to officiate in a church in Charlestown. While sitting in the pulpit he noticed that the side-galleries of the church showed that they were overloaded, and rising, he said to the congregation, "There will be no services in this house this evening." A murmur of indignation arose, and in giving vent to it over what they supposed to be merely one of the inexplicable eccentricities of the man, the church was emptied very slowly and without shock to the overloaded galleries. But before the church was entirely empty he announced that he would lead the services from the church steps. A similar forethought might have averted the casualties resulting from the fall of an iron-pillar in the Church of the Immaculate Conception on Fourteenth Street, New York, during a crowded morning service on the eleventh of December. A similar story of the presence of mind of a speaker, in slowly relieving the load in a dangerously crowded building, is attributed to General B. F. Butler, who adjourned a crowded political meeting from a hall to the public square.

Two years ago during an excursion of one of the national engineering societies, while holding their meeting in Boston, they visited an establishment for the purpose of listening to the exposition of important engineering matters by their designer. The members did not enter the room in the order of their going, but their president brought up the rear, who noticing that the beams and joists of the floor above were showing unusual flexure by reason of the excessive load imposed upon it by the crowd, summoned the help of a number of workmen, and the floor above was shored up as the weak places were disclosed, and in this manner without alarming or even informing any of the crowd above, a most deplorable accident was undoubtedly averted by the energy and presence of mind of one person.

Accidents to buildings are, in many cases, primarily due to faulty foundations. Walls are placed on inclined ledges, in some instances even those overlaid with clay, without cutting steps in the ledge in order to remove any horizontal component due to the load of the structure. At the present time I have knowledge of a building resting on an inclined bed of clay which has already moved about six inches in a horizontal direction, and although only one story in height it is fissured with cracks, and only held together by means of numerous and unsightly tie-rods. Such accidents are frequent in buildings placed on the banks of rivers.

Under certain conditions, buildings have been injured by reason of too broad foundations; that is, when placed upon compressible earth, portions would settle unequally. A very high mill which was recently taken down in Eastern Massachusetts to make way for one of modern construction and corresponding facilities for manufacturing has settled under the walls about three inches more than under the columns, making the floors more like a ship's deck than is usually found on land. Such injury may be obviated by the use of the system of independent foundations which are so arranged as to impose a uniform load per square foot upon the earth. Some of the buildings in Chicago have been erected upon such foundations receiving a uniform load of about two tons to the square foot, and the settlement of such structures is uniform and without injury to the building, while it is well known that many buildings in that city have been very seriously injured by unequal settlement.

Another difficulty in foundations, especially those under mill buildings, has been due to springs or to water oozing from the canal furnishing the water-power and percolating under the walls.

Other injuries have owed their origin to the decay of piles which were cut off at a grade above that of the water-stratum in the earth, and there have also been difficulties arising from the transverse yielding of the piles in the soft-earth of the Back Bay, Boston, which was caused by the horizontal stress from the roadway; although these mishaps have been infrequent except in the case of the approaches to the highway bridges in that portion of the city.

The knowledge of resistance of materials is undoubtedly more complete in regard to transverse-stress than any other element of applied mechanics. The simplicity of the general problems is such that the precedents which form the basis of all formulas are easily assimilated in the mind of observing persons, even though they cannot integrate their own mental actions; and the intuitively correct judgments of persons of practical experience yet without any knowledge of mechanical principles in regard to the question of safety of a structure under transverse loads, is a matter of frequent course; but, when any complication is introduced in a design, the mind of such a person is rarely trustworthy from inability to conform to new conditions. A complete formula is nothing but organized experience, and it requires more skill to apply a formula than to deduce it. One of the leading engineers in this country once declared that the art of machine-design consisted in the free use of pig-iron; and in this connection it may be truly said that a good designer must be a good copyist.

A frequent error in floor-design is caused by the endeavor to obtain an economical distribution of material by increasing the depth of the beams and diminishing the width, so that the intensity of pressure at the points of support exceeds what should be permitted for conditions of safety, and such beams sometimes shear off near the points of support rather than break by bending. The resistance of wood to transverse-pressures is about one-third that of compression in the line of the grain, and it is

[1] Continued from page 134, No. 612.

noticeable that the transverse contraction by seasoning amounts to three-eighths of an inch or more per foot. A due consideration of these facts should prevent any one in the design of a mill-structure from placing wooden bolsters over the columns, and transmitting the load from one column through the bolsters and beam to the column below; but rather let each column be surmounted by a cap of at least three times the area of the cross-section of the column, and above this an iron-pintle should run to the plate forming the base of the column above. In this manner the whole resistance of the column can be utilized and the building saved from being thrown out of line with the attendant deterioration and injury to machinery by the aggregate movement due to the transverse contraction of the beams and pilasters, which reaches an excessive amount in the upper stories of a high building.

Since the days of Samson, it might appear that careful attention would be given to the strength of columns, but it is within the memory of persons too old perhaps to be called young men, but not old enough to call themselves so, to recall a deplorable accident to a mill which fell in a neighboring manufacturing city, with attendant loss of life and serious injury to person and property. It was shown in the course of investigations following that matter, that the columns supporting that mill were hollow iron pillars of unequal thickness on opposite sides, owing to the floating or dislodgment of the cores when founded in a horizontal position. These columns were, moreover, further weakened by a three-inch pintle pressing upon cast-iron plates three-fourths of an inch thick, and six-and-three-fourths inches across the hollow end of the column, which caused the pintles to punch through the ends of the column as soon as the equilibrium of the mill was disturbed. Those desiring to examine into the matter, can see a drawing representing the whole arrangement in the "*Transactions of the American Society of Mechanical Engineering,*" Vol. II, page 271.

But these mills were not the only ones loaded to a dangerous extent, or with iron-columns containing shells of unequal thickness: during other investigations I have seen instances where iron-columns safe for twelve tons, using a factor-of-safety of five, have sustained thirty-six tons for nearly thirty years. In another instance, wood-columns whose estimated resistance to crushing was thirty-eight tons, had sustained a load of seventeen-and-one-half tons for fifteen years.

In some repairs upon a mill, the excessive deflection of a large cast-iron beam was noticed, and the careful computation of the load upon it and also its resistance to breaking showed that the beam had sustained eighty-five per cent of its estimated breaking-weight for forty years.

These instances are given not as precedents to justify small factors-of-safety, but merely to illustrate what dangerous elements of construction are comparatively frequent, and yet by reason of other matters of unusual stability by way of foundations or walls, the stress upon these members has been so uniform and free from transverse or other disturbances that the logical result of such continued loads has not occurred.

It should be carefully arranged in the design of storehouses that the height of each story should not be sufficient to allow an excessive weight of goods to be placed in each room.

A building connected with a woollen mill, built for the purpose of holding empty goods cases, was afterward used for storage of compressed bales of rags for shoddy, loading the floor so that the modulus of rupture upon the spruce-beams amounted to three thousand and two hundred pounds, or twice that which a due consideration for safety would have allowed.

A large amount of terra-alba was stored in a building of a paper-mill designed for the bins of paper trimmings, and before morning the clay had passed into the cellar by the most direct route. Experiments upon full-sized wooden columns at the Watertown Arsenal show as a result that Southern pine columns would sustain, on the average, four thousand and four hundred and fifty pounds to the square inch, while it is known that the general allowance of load upon such columns is six hundred pounds to the square inch, and that they sustain this load without depreciation or sign of weakening.

The most frequent cause of depreciation of buildings arises from dry-rot of timbers, which can generally be avoided by allowing the air to have free contact with the timber, and the application of whitewash or plaster on wire-lath seems to preserve timber as well as protect it against fire. There have been some instances where the plaster has been covered with stucco for decorative purposes, completely sealing the timber against the air, and this in turn has been followed by dry-rot

The use of tinned-coverings upon large timbers and doors for the purpose of defense against fire, is apt to cause dry-rot when the lumber is imperfectly seasoned; and, as such tinned fire-doors have served their purpose better than any other type of fire-doors, it is important that they should be constructed of well-seasoned stock.

A similar cause of dry-rot results from attempts at decoration by varnishing partially seasoned timber which completely seals it up, and furnishes the most perfect expedient that can be adopted to accomplish this end. It requires at least six years after the building is finished, to season Southern pine timbers one foot in width.

Beams are frequently sealed so tightly where they enter the wall that dry-rot takes place within the walls, while the exposed portion of the beam within the room is entirely sound.

A large mill was built a number of years ago, just previous to the failure of the corporation, and lay unoccupied for about five years. When the property was sold, the new owners did not dare to place machinery in this mill until the beams had been removed and new ones substituted. The portion of the beams in the rooms was entirely sound, the decay being limited to the portion built into the walls.

The general method of construction to obviate the difficulty is by building pilastered walls containing vertical flues into which the end of the beams project, while at the side of the beams and on top, a slight air-space is left during construction.

Dry-rot frequently occurs in the beams of the first story of a mill without any cellar, and it has been obviated in the most successful manner in cotton-mills by running a flue from the picker-room to this space under the mill, and making a number of six-inch holes through the underpinning walls of the mill; the pickers requiring a supply of air draw it from outdoors beneath the mill, and in that manner dampness is prevented from gathering upon the beams.

It is proverbially well-known that wood will withstand decay when kept either entirely wet or absolutely dry. The piles that supported the houses of the pre-historic dwellers over the Swiss lakes, and the wood in the tombs of Egypt, both attest the accuracy of this statement. But in a more familiar way it may be noticed in the beams used in wet places around water-wheels where timber pressed against a wet ledge will decay towards the wheel where it is exposed to dampness, and remain perfectly sound at the end which is constantly wet.

Much has been said and little done about the antiseptic treatment of timber. The most valuable contribution to the subject being contained in the "*Transactions of the American Society of Civil Engineers,*" Vol. IV, page 274, but the difficulty with all preparations has been their solubility in water or their expense. Lime seems to be the most perfect preservative for wood as long as it can be kept in contact with it. Exposure to water which will remove the lime, will, of course, leave the wood defenceless, although one may notice in the old-style paper-mills operated by overshot wheels, that the portion of the wheel receiving the lime refuse thrown out from the bleaches will remain sound, while the rest of the wheel will decay with a rapidity dependent upon the character of the water in the stream and the lumber employed. The general value of lime as a preservative of wood, may be noted when one considers the admirable condition in which laths are always found. I doubt if any one ever knew a decayed lath to be removed from contact with plaster.

The use of modern types of rolled-iron beams has been followed by the most satisfactory results in the matter of safety; a result no doubt largely due to the skilled supervision which such work has received, but in a great measure it is ascribable to the excellent tables and information of the most reliable nature contained in the catalogues issued by the rolling-mills, which are prepared by the best engineering skill, and are far more trustworthy than pretentious treatises upon the subject.

It should be stated that the foregoing notes are offered entirely from the standpoint of an engineer, and not from that of an architect who is obliged to consider these various problems in combination with elements of design, and also with questions of convenience which are rarely in harmony with the best conditions of applying engineering principles and economical distribution of material.

Like all other works of mankind, those of the architect do not reach an idealism, but their defects are generally the result of obstructive conditions limiting every element of the work, and far from what would be done in accordance with the untrammelled judgment.

As Carlyle said of Voltaire, "You, indeed, swing the torch to burn old abuses, but where do you wield the hammer to build new reforms."

It is, indeed, more easy to offer a criticism than to apply any practicable suggestions with prospect of prevailing; knowing that the accomplishment of sounder methods of buildings can be established only as public sentiment is developed to require such courses as will attain greater measures of stability, permanence and beauty. C. J. H. Woodbury.

[To be continued.]

OPEN-TIMBER ROOFS OF THE MIDDLE AGES.[1] — III.

(*B* 3) *Collar-braced Roofs.*

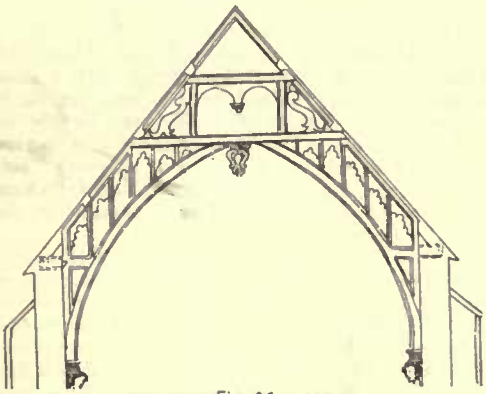


Fig. 36.

The collar-braced roof is properly considered as a simplification of the hammer-beam. It had been found, as is shown in the different varieties of hammer-beam roofs (33, 34, 35) that the different members, as collar-beam, braces, etc., could be separately dispensed with. In the Westminster example it was evident that the ability of the hammer-beam for so large a span had been questioned and assistance was sought and obtained in the form of the large arch. As a matter of fact, the arch does nearly all the work, as may be seen from the method of framing. The next step in the order of development, therefore, was to discard the hammer-beam itself (Fig. 36) and emphasize other members, viz., the collar-beam and braces, whence the name collar-braced roof. The forms of trusses used in this kind of roof often resemble those used in the trussed-rafter roof, but it must be remembered that the former is double-framed, whereas the latter is a single-framed roof. This distinction must be kept in mind, for the term collar-braced roof is made to include roofs in which the braces are very flat and the collar-beam is reduced to a mere wedge at the ridge. (See Figure 37.)

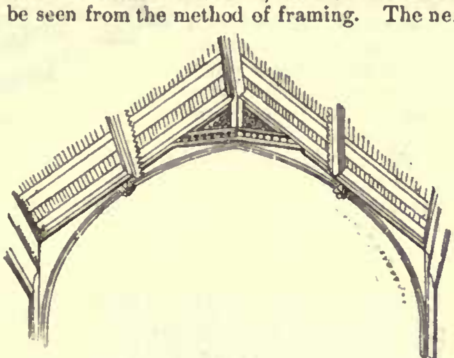


Fig. 37.

Collar-braced roofs, with flat Tudor arches, were used in the late Perpendicular period, but were, of course, limited to small spans.

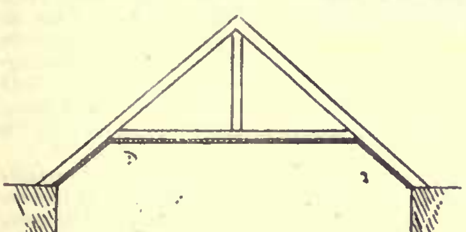


Fig. 38.

ROOFS AS THEY OCCUR IN THE HISTORICAL STYLES.

Norman. — The wooden roofs of the period are of the simplest type. Generally the tie-beams are placed close together, and to their undersides a flat wooden ceiling is nailed. Often, however, the roofs are not sheathed, but in such instances there is little effort toward decorative treatment. The roofs of Rochester and Winchester are cited by Rickman as examples of Norman open-timber roofs, while that at Peterborough is typical of the flat-boarded ceiling class. At Peterborough the tie-beam is raised so as to give a form like that in Figure 38. The ceiling is painted with a geometrical design, in which appear zigzag lozenges and other characteristic Norman ornament. The roof at Ely is treated in a similar style, but the roof takes a pentagonal shape somewhat as shown in Figure 39.

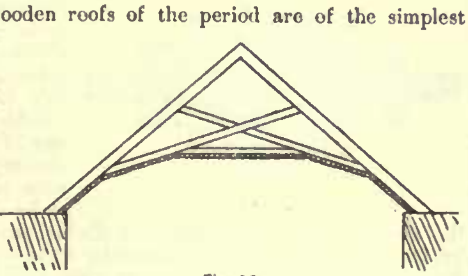


Fig. 39.

Early English. — Very few examples exist of roofs which can be clearly distinguished as belonging to this style. The trussed-rafter roof is generally supposed to have come into use during this period. The decorative treatment is rather plain. The timbers are usually chamfered; the tie-beam is sometimes moulded. Wooden ceilings in imitation of stone-vaults are found, the details of which are Early English in character. An example of such a wooden roof was shown in Figure 2. The cloisters of Lincoln were roofed in this fashion. The pitch of the roofs in this period was steep and did not vary much, the angle at the ridge generally approximating a right angle.

Decorated. — The construction of roofs in this period does not differ materially from that of the preceding except in the more careful elaboration and greater richness of details. A form of frequent occurrence is the trussed-rafter with arched ribs. Interrupted mouldings are terminated with carved leaves, etc. Spandrels where they occur are generally pierced and filled with tracery. An interesting roof is that over the Archbishop of Canterbury's palace at Mayfield, Sussex. This roof is really supported by great stone-arches, a device that was adopted in several other places.

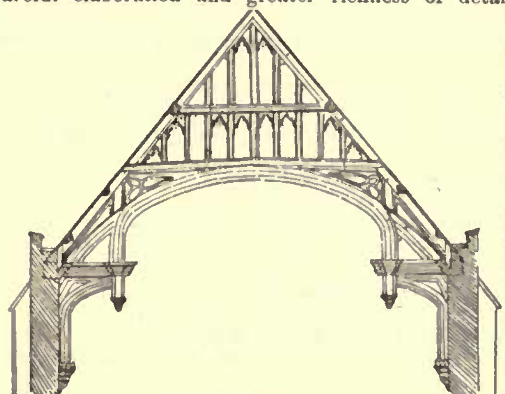


Fig. 40.

Perpendicular. — The characteristic roof of this period is the hammer-beam, of which the best known specimens are those at Westminster Hall, Hampton Court, and Eltham Palace. The roof of the hall at Eltham (Figure 40) is not so large nor so well designed as that at Westminster. The large arch is made so flat and the hammer-beam braces are so short and placed so high up that the constructive proportions of the hammer-beam roof were, as Fergusson says, destroyed. In fact the constructive significance of the big arch, so striking in the Westminster example, is neglected in that at Eltham. Nevertheless, "with all its constructive faults there are few examples of more elegance to disarm criticism and invite admiration."[2]

These hall-roofs were very large and elaborate. Those used in churches were much smaller and less pretentious. A good example of a roof of the latter class would be that of Trunch Church (Fergusson, Vol. II, page 183.) In Figure 34 the main lines of the roof may be seen. As has been said, the varieties of the hammer-beam roof are many, no two, in fact, being exactly alike. All, however, are characterized by rich decoration, tracery, mouldings, bosses, angels, etc., are found in great profusion.

Another kind of roof commonly used in churches of small span is the tie-beam roof of very low pitch (Figure 19.) In this roof the purlins and rafters were made by their intersections to form squares or oblongs. These were marked by flowers or shields, or filled with tracery; the effect in general being one of panels so characteristic of this style.

CONCLUSION.

Material. — The timber used in the construction of these roofs was oak. Chestnut is said to have been used to some extent, but the statement cannot be said to have been substantiated.

Fastenings. — The invariable method of fastening timbers together was by mortice, tenon and wooden pin. No iron bolts or straps were used. The reason for this is that the corrosion of the iron is followed by decay of timber, and this by loosening of bolts.

Purlins. — In almost all the roofs it will be observed that the purlins instead of lying over the principals, as in ancient and modern roofs, are framed into them, thus making the common rafters flush with the principals on their upper surfaces.

Ridge. — One peculiarity to be noticed in the framing of the rafters is the absence of the ridge piece, the rafters being simply halved and fastened by an oak pin. Even where the ridge piece is found the rafters are framed as before, and the ridge timber appears beneath them.

"There can be no doubt that in many cases the Gothic carpenters relied too much on the sizes of timbers and the strength of timber used, rather than on strictly scientific construction."[3] This is undoubtedly true, but it is to be said on the other hand, that one great beauty of many of these designs is that they show that due allowance has been made not only for sufficient strength for actual construction but also for the appearance of strength, an effect that is always satisfactory.

[1] Continued from No. 631, page 41.

[2] From an article on "*British Carpentry*," *Building News*, 1870.

[3] From an article on "Roof Construction of the Middle Ages," *Building News*, 880.

Decoration.—Many of the roofs were decorated both by color and relief. Red, green, yellow and gold were the colors most frequently used. The carving is always excellent.

"So essential does the vault appear to have been to Gothic architecture . . . that it is at first sight difficult to admit that any other form of covering can be as beautiful. But some of the roofs in English churches go far to refute the idea. Even, however, if they are not in themselves so monumental and so grand, they had at least this advantage, that the absence of the vault allowed the architect to play with the construction of the substructure. Great merit of the wooden roof was that it enabled the architect to dispense with all flying-buttresses, exaggerated pinnacles and mechanical expedients, which were necessary to support a vault, but which often sadly hampered and crowded his designs." [*Fergusson.*]

APPENDIX.

A list is subjoined of the authorities, consulted in the preparation of this paper.

Brandon. "*Open Timber Roofs.*"
Builder, 1876. Article on the "Architectural Treatment of the Roof."
Building News, 1870. Articles on "British Carpentry."
Building News, 1876. Articles on "Woodwork."
Building News, 1880. Articles on the "Roof Construction of the Middle Ages."
Davies. "*Architectural Studies in France.*"
Fergusson. "*History of Architecture.*"
Hubsch. *Monuments de L' Architecture Chrétienne.*"
Johnson. "*Specimens of Early French Architecture.*"
Parker. "*Glossary.*"
Rickman. "*English Architectural Styles.*"
Smith. "*Specimens of Ancient (British) Carpentry.*"
Tredgold. "*Elementary Principles of Carpentry.*"
Viollet-le-Duc. "*Dictionnaire Raisonné de L' Architecture*" (Charpente.)

HARRY ELLINGWOOD DONNELL.

ILLVSTRATIONS

[*Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.*]

CHURCH OF ST. PIERRE, MONTREAL, P. Q.

[Gelatine Print, issued only with the Imperial Edition.]

For some mention of this building, see the *American Architect* for October 1, 1887.

HOUSE FOR P. E. CHILLMAN, ESQ., CHESTNUT HILL, PHILADELPHIA, PA. MR. J. C. WORTHINGTON, ARCHITECT, PHILADELPHIA, PA.

MATERIAL, Chestnut Hill stone throughout; roofs throughout, cedar, shingle stained with Cabot's Creosote Stain; woodwork painted in neutral colors; gable ends, dashed plasterwork; interior finish, white pine, natural finish; hall in oak. Building about 40' x 50'. Cost approximates $8,000. The special feature of the house is in arrangement of bath and water closet rooms, which may be made common or separate at will.

HOUSE OF A. O. LANE, ESQ., BIRMINGHAM, ALA. MR. EDOUARD SIDEL, ARCHITECT, BIRMINGHAM, ALA.

This house is now in course of construction and is situated on the corner of 8th Avenue and 19th Street. It is built of stone, cast-iron, St. Louis pressed brick, and has a slate roof; contains all the modern improvements in the way of heating, ventilation, and electric bells, etc. It will cost when completed $30,000.

COMPETITIVE DESIGN FOR THE NEW YORK LIFE INSURANCE BUILDING, ST. PAUL, MINN. MR. J. WALTER STEVENS, ARCHITECT, ST. PAUL, MINN.

HOUSES FOR E. W. COOPER, UTICA, AND FOR PROF. H. C. J. BRANDT, CLINTON, N. Y. MR. EDWARD W. COOPER, ARCHITECT, UTICA, N. Y.

STREET IN ST. LIZIER, ARIÉGE, FRANCE. SKETCHED BY MR. H. P. KIRBY, ARCHITECT.

The Death of M. Godin of Guise.—The founder of the "Familistère" at Guise, Aisne, has just died. St. Jean Baptiste André Godin was the son of a locksmith, and was born in 1817. In 1846 he set up as an iron-founder at Guise, and speedily became wealthy. In 1859 he erected the "Familistère," consisting of 600 cottages, with co-operative shops, club, theatre, etc., for his workmen. In 1871 he was elected a Deputy, but withdrew from public life in 1875.—*London Times.*

FOURTH ANNUAL REPORT OF THE BUREAU OF ETHNOLOGY.[1]—III.

FRANK HAMILTON CUSHING ON PUEBLO POTTERY AND ZUNI CULTURE GROWTH.

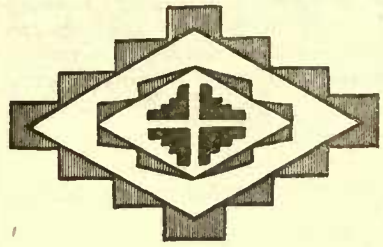


Fig. 510.

THE paper by Mr. Frank Hamilton Cushing on "A Study of Pueblo Pottery as Illustrative of Zuñi Culture Growth" is made, by the method adopted, a most important and remarkable contribution to ethnological research. It appropriately follows the papers by Mr. Holmes, for, in pursuing a different line of investigation, Mr. Cushing affords absolute confirmation of the correctness of Mr. Holmes's conclusions, arrived at wholly from an archæological standpoint. Mr. Cushing combines his archæological knowledge with a close intimacy with the Zuñi tongue, obtained by his long course of ethnological researches among that people. Working largely on linguistic lines, in a way that shows the born philologist, with rare ingenuity he weaves from the inherent evidences of language a network of evidence that runs far into the forgotten past, and from vanished ages he brings facts concerning the origin of an art into the light of this century's knowledge.

Through the kindness of the Bureau of Ethnology, the *American Architect* was enabled a few months ago to lay before its readers, from advance sheets, the first part of Mr. Cushing's paper relating to "Habitations affected by Environment." It formed a unique contribution to the literature of "American architecture" in the purest sense, and therefore it was with peculiar appropriateness that it first saw the light in this journal. Many of our readers must have been impressed with the strength of the evidence afforded by the linguistic argument whereby was indicated the probable sequence of architectural types in the evolution of the Pueblo, from the brush lodge, of which only the name survives among the Zuñis of to-day, to the present many-storied and terraced communal structures to be found throughout New Mexico, Arizona and contiguous regions.

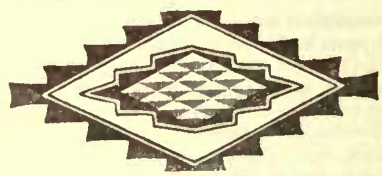


Fig. 511.

The linguistic evidence of the derivation of Zuñi pottery from basketry, as cited by Mr. Cushing, affords a complete chain of proof. He describes the lining of a shallow tray of basket-work with clay to make it available for roasting purposes or processes, which he has witnessed among the Havasupai Indians, a sedentary tribe isolated in the Colorado Cañon. This clay lining, hardened by continual heating from the coals placed upon it, when detached from its matrix of osiers, forms in itself a complete roasting-vessel. The modern Zuñi name for a parching-pan; a shallow bowl of black-ware, has a name of the same meaning as that applied to a basket tray, signifying "a shallow vessel of twigs."

Fig. 512.

Anciently, boiling was done, with the aid of hot stones, in water-tight baskets of pot-like shapes. These and kindred forms of basket-vessels were often quite elaborately ornamented by angular devices, like serrated bands, diagonal or zig-zag lines, chevrons, and even terraces and frets. Mr. Cushing traces the development of these methods of decoration to the elaboration on suggestions of the lines and figures unavoidably produced in wicker-work of any kind when strands of different colors happen to be employed together and even by slight discolorations in occasional splints. The probability of this view is shown by a consideration of the etymology of a few Zuñi decorative terms. A terraced lozenge on their pottery, instead of being named after the abstract word that signifies a double terrace, or two terraces joined at the base, as would naturally seem to be what they would do, is called by a word signifying "the double-splint-stitch-form mark," a term clearly derived from basket-work, as may be seen from a comparison of Figures 510 and 511 with 512 and 513. Also, a pattern composed of a series of diagonal or oblique parallel

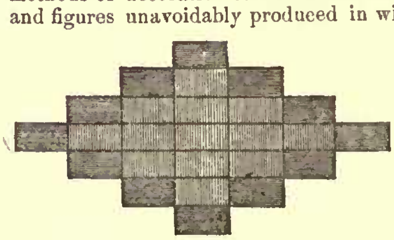
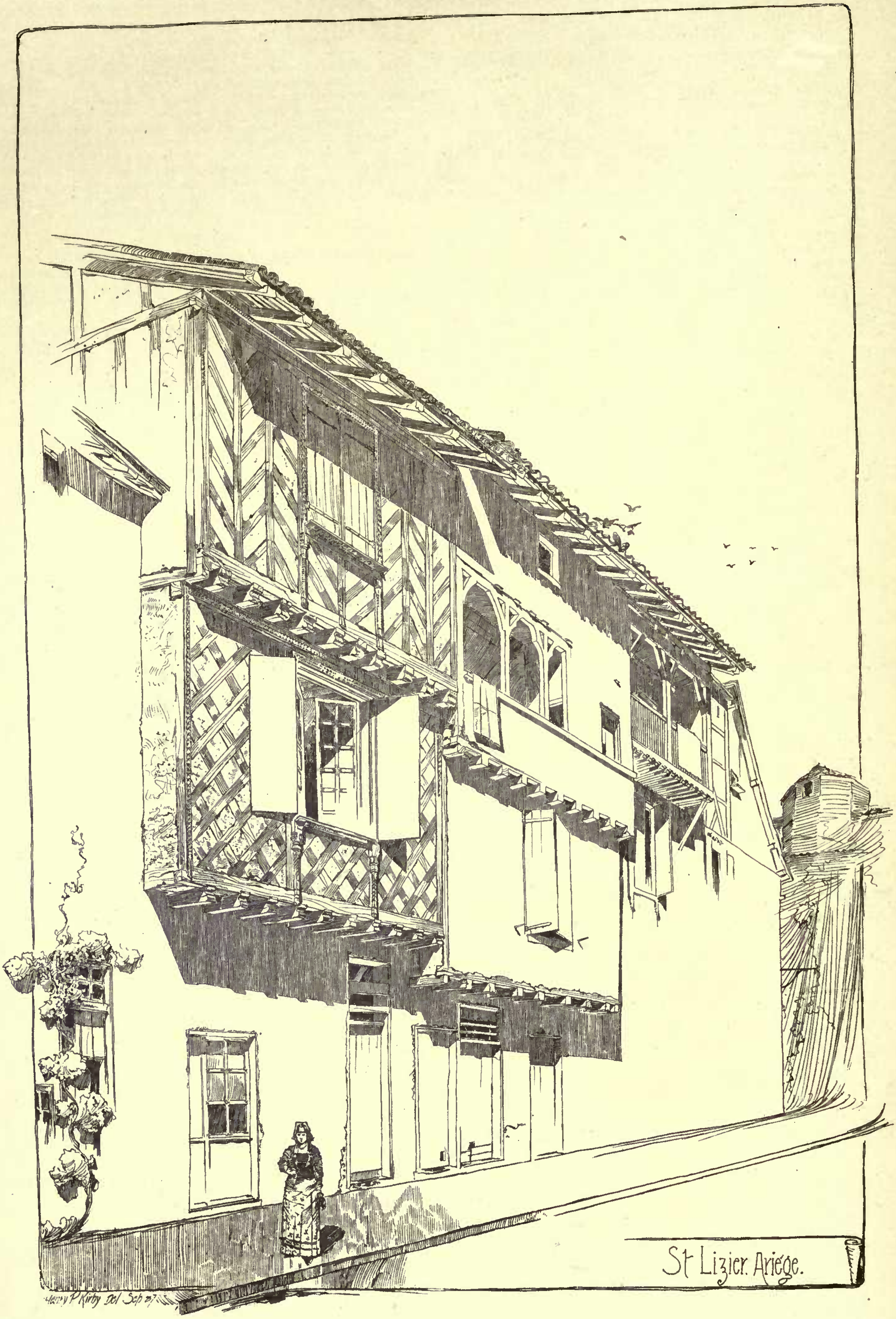


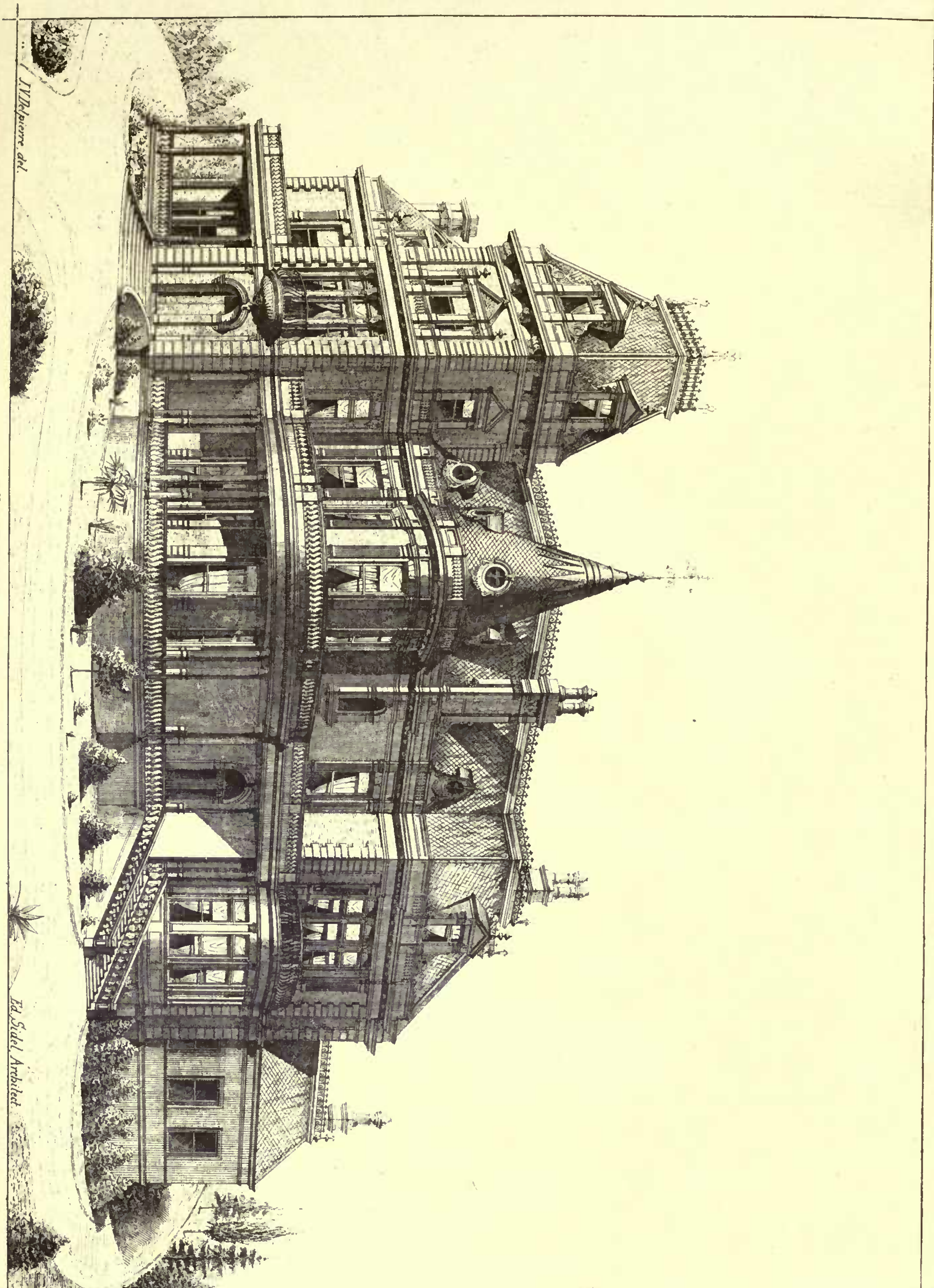
Fig. 513.

[1] Continued from No. 631, page 45.

COPYRIGHT 1888 BY TICKNOR & Co



COPYRIGHT 1886 BY TICKNOR & Co



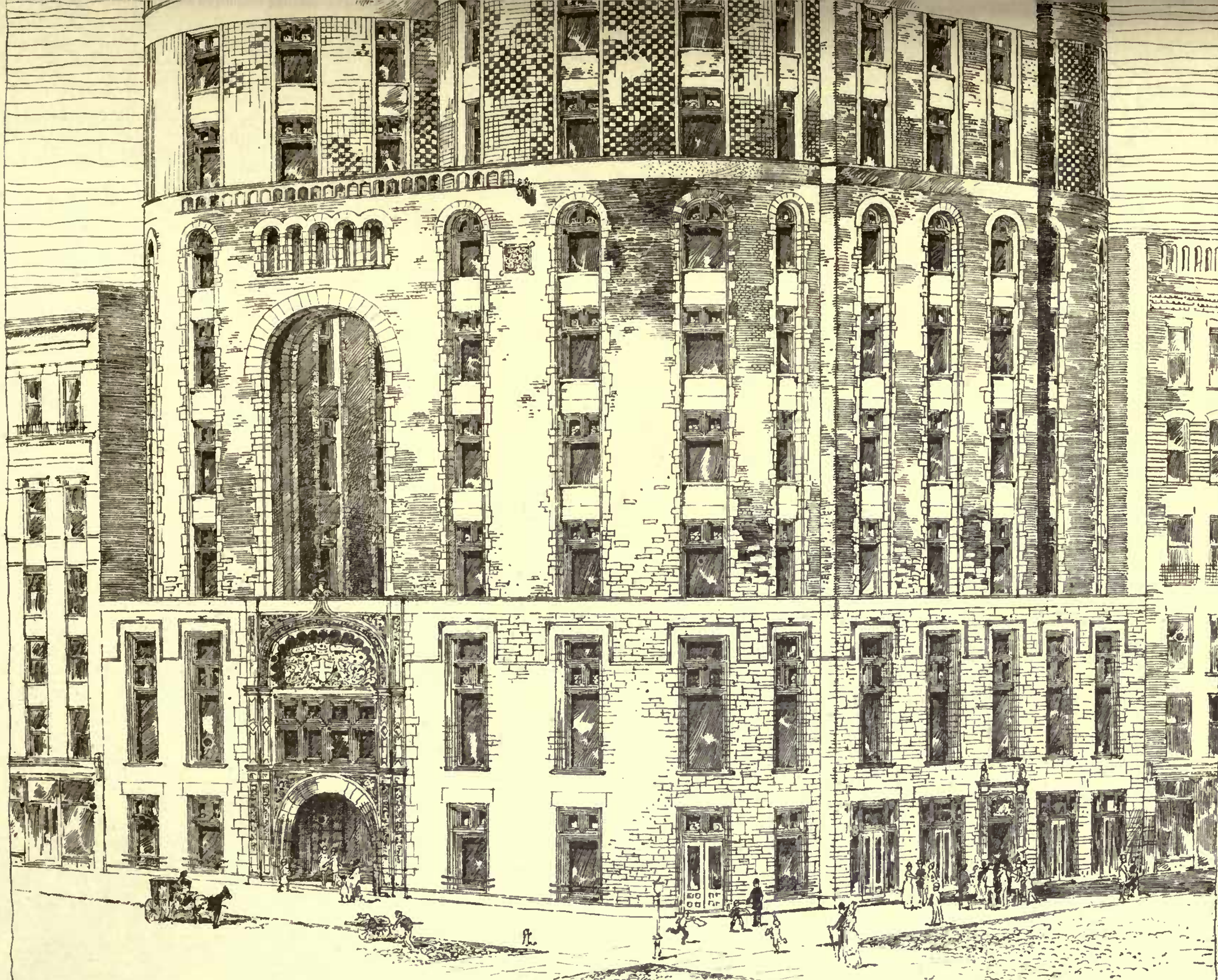
J. V. Delpierre del.

Ed. Sidel, Architect.

Heliotype Printing Co. Boston.

RESIDENCE OF HON. A. O. LANE

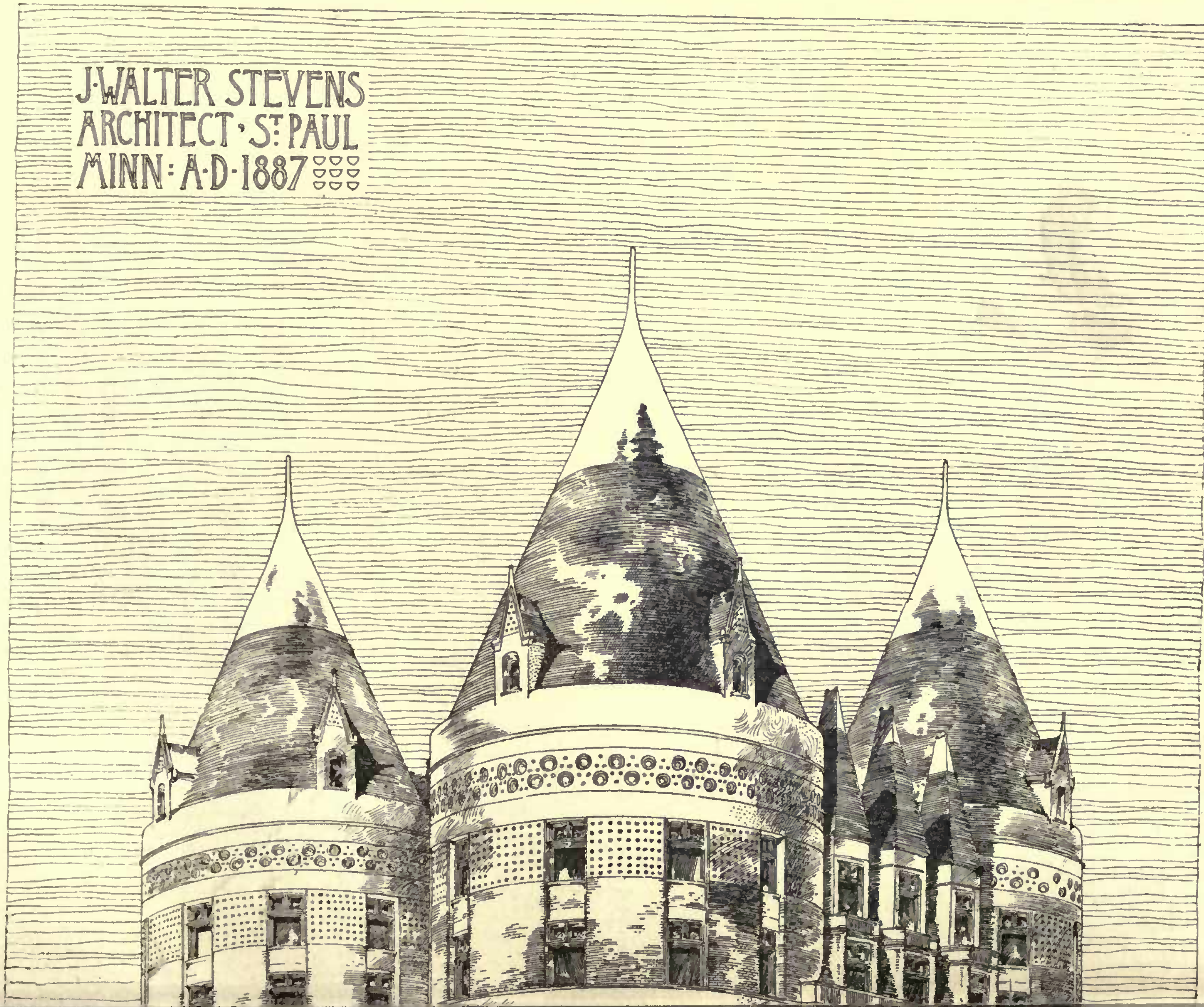
BIRMINGHAM. ALA.



Design submitted for the New-York Life-Insurance Co. Bldg. St. Paul, Minn. March 17th 1887

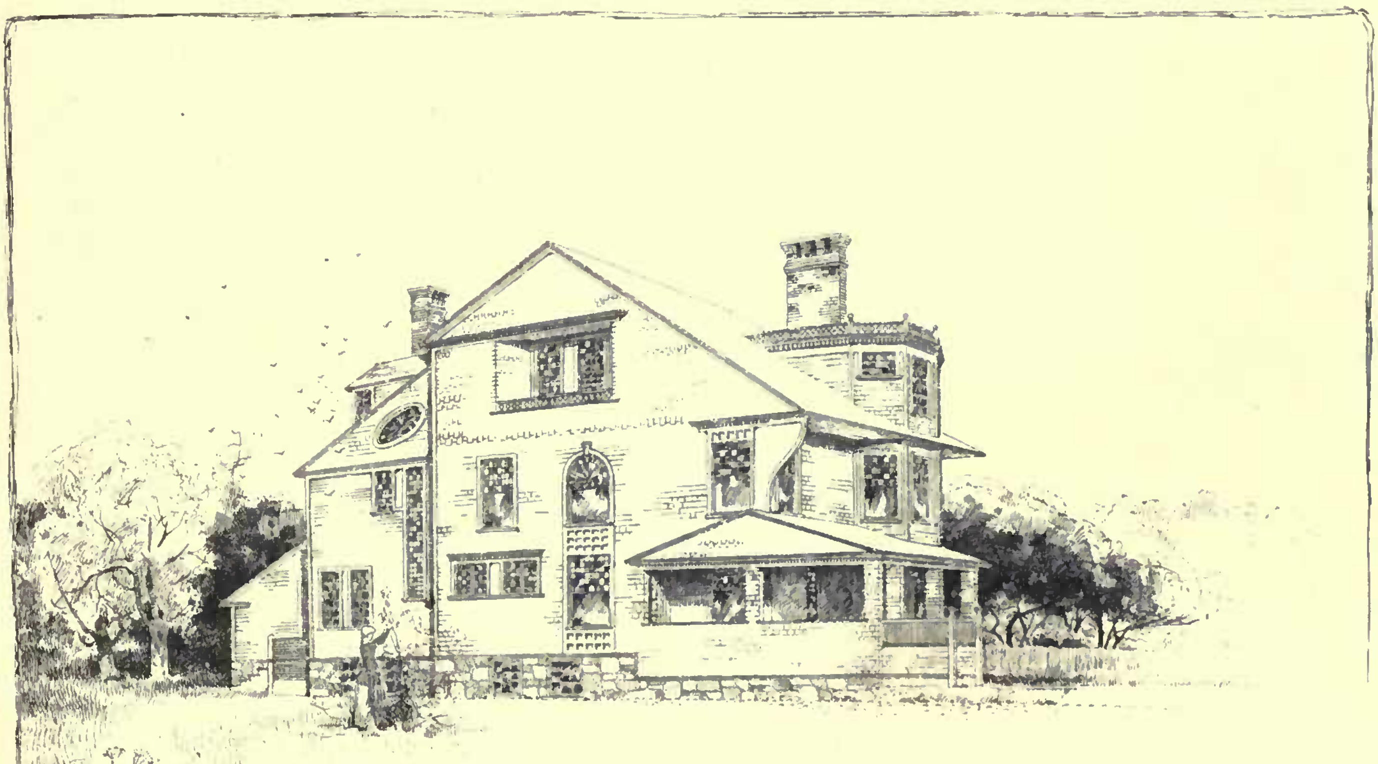
Heliotype Printing Co. Boston.

COPYRIGHT 1888 BY TICKNOR & CO



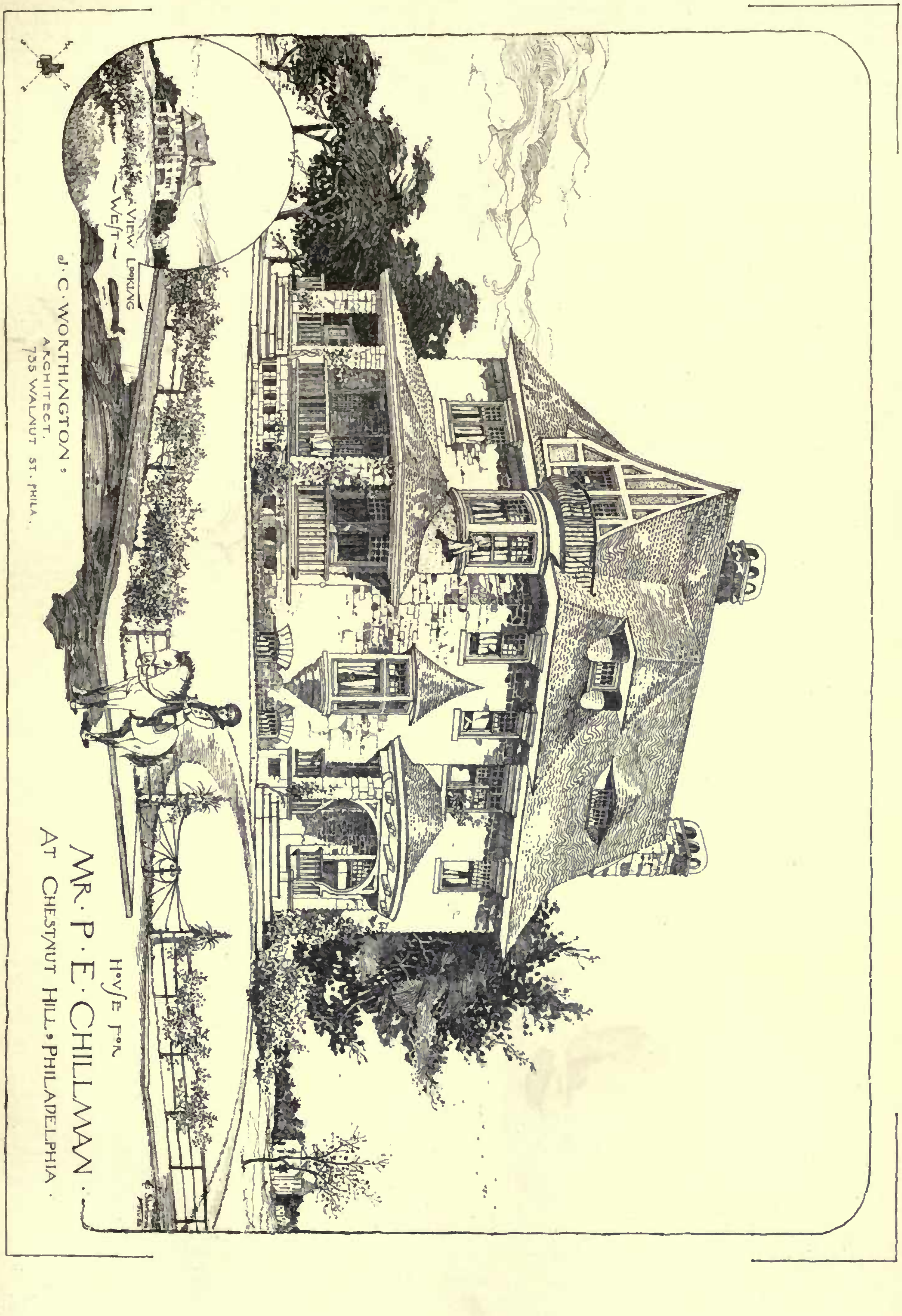
COPYRIGHT 1888 BY TICKNOR & Co

Residence of Prof. H. C. G. Brandt, Clinton, N.Y.
C. Edward Cooper Arch. Utica N.Y. A.D. 1885.



Residence of C. Edward Cooper, Archt.
"Jewett Place"
Utica N.Y. A.D. 1885-6.

COPYRIGHT 1888 BY TICKNOR & CO.



lines, as in Figure 514, is called a name meaning "tapering" or "neck-splint mark." "Curiously enough, in a bottle-shaped basket, as it approaches completion, the splints of the tapering part or neck all lean spirally side by side of one another (see Fig. 514), and a term descriptive of this has come to be applied to lines resembling it, instead of a derivative from *ás sĕl lai e*, signifying an oblique or leaning line. Where splints variously arranged, or stitches, have given names to decoration — applied even to painted or embroidered designs — it is not difficult for us to see that these same combinations, at first unintentional, must have suggested the forms to which they give names as decorations."

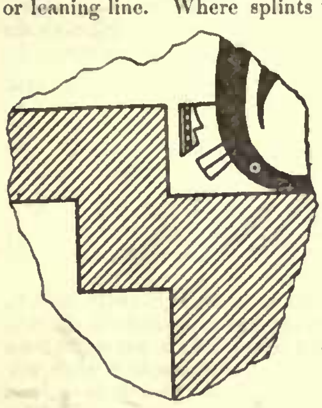


Fig. 514.

It seems that the method of forming basket-work by a coiling process suggested the method of making pottery by coiling it of thin ropes of clay. The evolution of the cooking-vessels of modern Zuñi from the coiled boiling-basket of ancient times is indicated by the close resemblance of form between the vessels of pottery and of basket-work, with even the rudimentary survival of the basket-handles in two conical projections near the rim of the clay pot, varied in later times to form scrolls. A most convincing link in this chain of connection, however, is to be found in the names of the two kinds of vessels, the name of one meaning "coiled cooking-basket" and the latter "coiled earthenware cooking-basket." Mr. Cushing shows how other important types of vessels of pottery developed in a similar way from basketry forms.

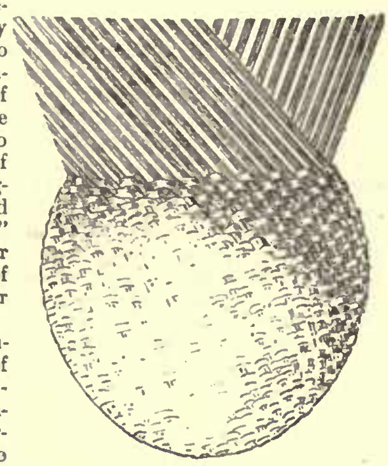


Fig. 515.

An important fact in influencing the development of the ceramic art of the Southwest is shown by Mr. Cushing to be the mineral character of a locality. "Where clay occurred of a fine, tough texture, easily mined and manipulated, the work in terra-cotta became proportionately more elaborate in variety and finer in quality. There are to be found about the sites of some ancient Pueblos potsherds incredibly abundant and indicating great advance in decorative art, while near others, architecturally similar, even where evidence of ethnic connection is not wanting, only coarse, crudely moulded and painted fragments are discoverable, and these in limited quantity." A modern instance is to be found in the outlying farming Pueblos of Zuñi, at one of which, there being an abundance of clays of several varieties and of color-minerals, the finest pottery of the tribe is made in great quantity, while at another, where clay is scarce and poor in texture, the pottery is of miserable quality and poor shape. The same holds true in regard to decoration; where the mineral deposits furnish a great variety of pigment-material, the decoration of the ceramic remains is "so surprisingly and universally elaborate, beautiful and varied as to lead the observer to regard the people who dwelt there as different from the people who had inhabited towns about the sites of which the sherds show not only meagre skill and less profuse decorative variety, but almost typical dissimilarity." Yet the inhabitants of both sections may be of common derivation and even closely related and contemporaneous.

An important fact brought out in Mr. Cushing's discussion of the materials employed and the methods resorted to in burning pottery, is that bituminous coal, according to tradition, was the most perfect fuel, and where abundant and accessible, was much used. Support is given to this tradition by the traces of little pit-kilns filled with cinders of mineral-coal about many of the ruins in the northwestern portion of the Pueblo region, coupled with the semi-fusion and well-preserved condition of most of the ancient jars found associated with them. Additional confirmation was found by Mr. Cushing by discovering that some excellent counterfeits of ancient pottery, brought him at Moki, were made by the use of bituminous coal. When asked why they did not use it commonly in burning their household pottery, the Indians told him that the pots broke more frequently than when fired with dried sheep-dung in the common way, and that the latter was also less troublesome, requiring only to be dug from the corrals near by and dried to make it ready for use. In this connection, it is of interest to remark that Professor Putnam's explorations in Ohio show that bituminous coal was also used by the mound-builders, although its use was not general, owing to the abundance of wood.

The remarks on the evolution of form and decoration are so suggestive and instructive that their brevity is to be regretted. The discussion of decorative symbolism gives a charming glimpse at Zuñi mythology. Mr. Cushing calls attention to the fact that on every class of food and water vessels, in both ancient and modern Pueblo pottery (with the important exceptions of pitchers and some sacred receptacles), it is a singular and almost constant feature that encircling lines and often even ornamental zones are not joined at the ends, a slight space always breaking the completion of the circle. He asked the Indian women, when he saw them making these little spaces with great care, why they took so much pains to leave them open. They replied that to close them was *ák ta ni*, "fearful!" — that this little space through the line or zone on a vessel was the "exit trail of life or being." Of course they could not tell how it came to be first left open and why regarded as the "exit trail." "But," says Mr. Cushing, "if one studies the mythology of this people and their ways of thinking, then watches them closely, he will, however, get other clews. When a woman has made a vessel, dried, polished and painted it, she will tell you, with an air of relief, that it is a 'Made Being.' Her statement is confirmed as a sort of article of faith, when it is seen that as she places the vessel in the kiln, she also places in and beside it some food. Evidently she vaguely gives something about the vessel a personal existence. The question arises, how did these people come to regard food-receptacles or water-receptacles as possessed of, or accompanied by, conscious existences. I have found that the Zuñi argues actual and essential relationship from similarity in the appearance, function or other attributes of even generically diverse things." This mental bias has both influenced pottery decoration and been itself influenced by it. The noise made by a pot when struck or when simmering on a fire is supposed to be the voice of its associated being. The clang of a pot when it breaks or suddenly cracks in burning is the cry of this being as it escapes or separates from the vessel. The fact that the vase when cracked or fragmentary never resounds as it did when whole is regarded as proof that this being has departed. "This vague existence never cries out violently unprovoked, but it is supposed to acquire the power of doing so by imitation; hence, no one sings, whistles or makes other strange or musical sounds resembling those of earthenware under the circumstances above described during the smoothing, polishing or painting, or other processes of finishing. The being, thus incited, they think, would surely strive to come out, and would break the vessel in so doing. In this we find a partial explanation of the native belief that a pot is accompanied by a conscious existence. The rest of the solution of this problem in belief is involved in the native philosophy and worship of water. Water contains the source of continued life. The vessel holds the water; the source of life *accompanies* the water; hence, its dwelling-place is in the vessel with the water. Finally, the vessel is supposed to contain the treasured source, irrespective of the water — as do wells and springs, or even the places where they have been. If the encircling lines inside of the eating-bowl, *outside* of the water-jar, were closed, there would be no exit trail for this invisible source of life or for its influence or breath."

Two considerations are submitted as to why the source of life, or its influence, must be provided with a trail by which to pass out. The difficulty of smoothly joining an incised line around a still soft clay pot, and the still greater difficulty when the ornamental band is laid on in relief, would naturally cause the savage to leave the ends unjoined. When paint came to be the decorative agent, the lines or bands would be left unjoined in imitation. As set forth in Tylor's "*Early History,*" a "myth of observation" like the above would come to be assigned in after ages. But whether this be true or not, Mr. Cushing considers it an insufficient solution of the problem.

The Pueblo, he goes on to say, naturally considers water the prime source of life, or as accompanied by it, for, without the presence of living water, very few things would grow in his desert land. He has therefore come to regard water as the milk of adults, to speak of it as such, and as the all-sufficient nourishment which the earth, in his conception of it as the mother of men, yields. When his race was

Fig. 548.

Fig. 549.

one of cliff and mesa dwellers, the most common vessel appertaining to his daily life was the flat-bellied canteen, or water-carrier, which was suspended by a band across the forehead, so as to hang against the back, thus leaving the hands as well as the feet free for assistance in climbing. Its form (Fig. 547) seems to have been suggested by that of the human mammary gland, or perhaps its peculiar form may have suggested a relationship, as may be seen by a comparison

of Figures 548, 549. Its name in Zuñi is derived from the same source as that of the human mammary gland. A surviving superstition inclines Mr. Cushing to the view that the *me he ton*, as it is called, was originally left open at the apex instead of at the top, but, being found to leak with the aperture so low, this was closed. When a woman has completed the vessel nearly to the apex, by the coiling process, and before she has inserted the nozzle, Figure 549, *b*, she prepares a little wedge of clay, and, as she closes the apex with it, she turns her eyes away. When asked why she does this, she replies that it is "fearful" to look at the vessel while closing it at this point; that if she look at it during this operation she will be liable to become barren, or various other calamities may befall her or those who drink out of the vessel! Mr. Cushing's impression is that, reasoning from analogy, the Zuñi woman supposes that by closing the apex she closes the way for the source of life, and that the woman who closes this way knowingly (that is, in her own sight) voluntarily closes the exit way for the source of life in her own mammæ, etc.

Other types of the canteen, of later origin, not only retained the name-root of this primitive form, but also its attributed functions. The canteens used by hunters, shown in Figure 550, has a name that means "mammaries joined together by a neck." In closing the ends, *c c*, of this curious vessel, the women are as careful to turn the eyes away as in closing the apex of the older form. The resemblance to the end of the mamma not being striking, they place on either side of the nozzle a pair of little conical projections, resembling the teats, and so called. The reason for there being four of these seems to be that this canteen is designed for the use of the hunter, whose proper nourishment is the game he kills; hence, the source of his life, like that of the young of his game, is symbolized in the canteen by the mammaries, not of human beings, but of game-animals. We are brought nearer to an understanding of the question under discussion by a feature in these canteens. When ornamental bands are painted around either end of the neck of one of them, they are interrupted at the little projections. Mr. Cushing has, indeed, observed specimens on which these lines, if placed a little further out, were interrupted at the top opposite the little projections, as shown in the illustration. It would seem that paint, like clay, came by analogy to be regarded as a barrier to the exit of the source of life. "This idea of the source of life once associated with the canteen would readily become connected with the water-jar, which, if not the offspring of the canteen, at least usurped its place in the household economy of these people. From the water-jar, it would pass naturally to drinking-vessels and eating-bowls, explaining the absence of the interrupted lines on the oldest of these and their constant occurrence on recent and modern examples, for the painted lines being left open at the apices, or near the projections on the canteens, they should also be unjoined on other vessels with which the same ideas were associated."

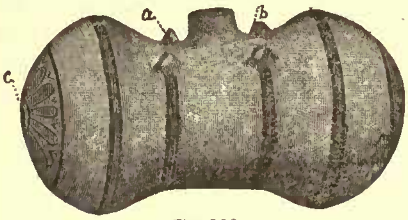


Fig. 550.

This description, which we have necessarily somewhat abbreviated, affords a good example of the subtile methods of research employed by Mr. Cushing, and shows how necessary it is to identify one's self with the life and mode of thought of a people in order to understand them with a correctness essential for true ethnological work. He concludes that we may hope, by a patient study of the ceramic remains of a people, no matter where situated, to discover what was the type of their pre-ceramic vessels, and thereby we might also learn whether, at the time of the origin of the potter's art or during its development, they had, like the Pueblos, been indigenous to the area in which they had been found, or whether they had, like some of the Central Americans (to make a concrete example and judge it by this method), apparently immigrated in part from desert North America, in part from the wilderness of an equatorial region in South America.

There are some things established by the linguistic evidences developed by Mr. Cushing which have a most important bearing on ethnological science. It is shown that the art of pottery-making must have been developed by a people speaking the Zuñi language — from the time of the primitive beginnings of the art founded upon basketry forms — entirely within its own ethnic lines, and apparently unaffected by influences from other peoples. And the long lingual line of descent which has thus preserved the tokens of the ancestry of forms from a past which must be considerably remote, shows a remarkable stability of language. Indeed, it proves how completely erroneous must be the theory advanced, we believe, by Mr. Herbert Spencer, that the languages of primitive or illiterate peoples are unstable. On the contrary, it seems safe to assume as an ethnological law that the language of a people is stable according to the stability of its environment. A language naturally changes to suit changing conditions, and the changes consequent upon a commingling of different peoples, like those entailed by the conquest of England by the Normans, resulting in a new and conglomerate tongue, are, of course, far more swift and radical than those coming from the removal of a people into even an entirely new set of natural surroundings. Investigation would probably show that while the language of a people is made more stable by a general literacy, which fixes and preserves its forms — as shown by the petrifaction of even grave errors of pronunciation and spelling by dictionary authority in the English tongue — the language of an illiterate nation of a high culture grade is made unstable by its subjection to the influences of foreign contact. But a race developing amidst a uniform environment and not subjected to foreign influences, would naturally evince a lingual evolution of a slow and gradual kind, corresponding to the normal growth of the race in thought as modified by experience.

Sylvester Baxter.

BOOKS AND PAPERS.

M. HENRY HAVARD, whose name is ever properly held in regard because of his works on art, has just put forth the first volume of his "*Dictionary of Furniture and Decoration*"[1] from the thirteenth century to our own days. The complete work will consist of four quarto volumes, in two columns, and will have from five hundred to seven hundred illustrations in each volume. In his preface, M. Havard says that the collection of the materials for this work, the researches and preparatory studies have demanded nearly ten years. This is not at all unlikely, considering the care and attention paid to details that one finds in every article. The author has delved amongst all the memoirs, all the journals, dictionaries and inventories century by century since the fourteenth, and it is from Froissart, Clement, Marot, Rabelais, Brantôme, Sévigné, D'Argenson, etc., that he has extracted instruction.

His object was to complete and, where possible, rectify the celebrated work of Viollet-le-Duc upon the furniture of the Middle Ages. This dictionary, to judge by the first volume which has just appeared, and includes the letters A to G, will be valued by the learned, by men of letters, archæologists and artists. Here gathered together and disengaged from every detail which does not refer directly to the word sought, are facts and documents, to discover which for himself would demand enormous time and numberless searches on the part of the artist or the inquirer who has need of it.

The practical side, without being absolutely neglected, occupies a more modest place in this work, which is written rather from the historic and anecdotical standpoint. In this respect the dictionary of M. Havard is very complete and exact. It is at the same time as interesting and amusing for the serious artist as for the amateur. Every word has its history and its complete genealogy — sometimes a little too long. In confronting so serious a work and such conscientious efforts, one experiences a scruple in risking any criticisms, especially before the work is complete, and consequently cannot yet be judged as a whole. Nevertheless, it may be allowable to point out at the present time the somewhat excessive agglomeration of details of quite secondary interest in certain articles considered and the brevity of certain others. The absence or the multiplicity of documents relating to these articles may be the cause of this, but the author might have been able to prune and condense a little more in some cases. The criticism of such works is a very delicate task; being addressed to everybody, that which seems useless to some may be precious to others, and M. Havard could answer complaint by citing such or such groups of artists, curiosity mongers, or investigators, for whom the very things which are considered valueless become the best of qualities. Thus, in order not to risk imposing an opinion which may not be shared and giving voice to an unjust judgment by looking at the matter from a point of view altogether too special, it is perhaps preferable to take certain articles in the dictionary and show in what manner they are treated. Let it be then two words of different characters — that of a movable utensil in daily use, such as a knife, and that of a portion of a habitation — a chamber. I choose these articles with intention. The first is a detail and occupies relatively a modest place in the ranks of furnishings; the second, on the contrary, the chamber, incloses a quantity of indispensable accessories which form the whole. It is interesting, therefore, to see how M. Havard has treated these two articles, and by applying the same method to other articles, one can more easily take cognizance of the utility and value of the work.

To the word "knife" have been devoted twelve columns and twenty drawings, and yet the author, leaving one side all the different applications of this utensil, has limited himself to mentioning the adaptations which strictly concern furniture and present a direct contact with the service of the table and the toilet. The article commences with a little history of the guild of cutlers, which, in the thirteenth century, was divided into two communities, one manufacing blades and the other handles. This separation did not long continue, and the two professions were united in the first half of the fourteenth century. At this time the richness of knives was already considerable. If proof were necessary, one could turn to the inventory of King Charles V, in 1380, where knives are mentioned in whose make-up enamelled gold, ivory and silver-gilt played the prin-

[1] "*Dictionnaire de l'Ameublement et de la Décoration,*" par Henry Havard. 4 vols., flexible binding. Price, $40. Paris: Maison Quintin.

cipal part. Here, too, is a description of a personage who was styled the master of carving and the ceremonial surrounding this personage, as well as the rules which regulated royal and princely tables during the fourteenth and fifteenth centuries. The form and color of the knives are quite curious: thus, the color of the handles was not the same during Lent as at Easter, nor at Easter as at the Passover. This curious custom is supported by numerous documents, and M. Havard cites some which emanated from Etienne de la Fontaine, silversmith to King John (1352), the accounts of Geoffrey de Fleury and Guillaume Brunel, silversmith to Charles VI (1387).

The historical and anecdotical side is treated profoundly, thanks once more to information derived from the trousseau of Marie de Bourgogne, countess of Cleves (1415), the inventory of the Château d' Angers (1471), etc. It is thus that we see amongst other things that the first personage who had any idea of rounding the point of a knife was Cardinal Richelieu, compelled to endure at his table the Chancellor Seguier, who ate in a most improper way and picked his teeth with a knife. Richelieu invented, the story goes, this means of preventing the Chancellor indulging before him in this ignoble practice. From that time all knives were made round-pointed.

From the seventeenth century they began to manufacture knives especially made for cutting fruit, as is stated in the inventory of the Baroness Castelmauron (Toulouse, 1668). Finally, the author speaks of toilet-knives, which, from the fourteenth century, were employed for cutting and cleaning the finger-nails. The eighteenth century substituted the pen-knife for the case-knife for this useful task. Then the file took the place of the pen-knife. Finally, in the eighteenth century, appeared on the toilet table of the ultra-fashionables a knife to scrape off face-powder. These little instruments were extremely rich in design; that of Madame de Pompadour had a lacquered handle, and the blade and ornaments in gold. Finally, the article closes with a few words on the modern paper-knife.

We see by this epitome how complete is the treatment of this article and with how many documentary proofs the author supports himself. What will they be then for a more important subject, such as is the chamber. Forty-eight columns — quite a small volume — are consecrated to it, and eighteen engravings, four full-page plates in color. And first of all comes the history of the word itself, and its meaning at different epochs. Formerly it designated indifferently all the rooms of a house; thus one said, "the king's chamber," "the bathing chamber," "the tapestry chamber," etc. This manner of designation persisted for generations. In the seventeenth century the "blue chamber" of the beautiful Julie D'Angennes was celebrated amongst the habitués of the Hôtel de Rambouillet. In our time the custom is continued, and in the châteaux they still designate the chambers by their color or the nature of the hangings; but the one chamber with which M. Havard concerns himself in his dictionary is the bedchamber, the room in which, throughout all time, people have slept.

In the feudal habitations of the fourteenth and fifteenth centuries we encounter two distinct kinds of chambers, although both are bedchambers — the *chambre de parade* and the *chambre au giste* still smaller. Charles V, ill in the Château de Beauté, suffers and is cared for in the *chambre au giste* upon a narrow palette, but when his last hour is near he is carried into the swell chamber and placed upon a grand ceremonial bed, in order that he can draw his last breath with becoming dignity and surrounded by the paraphernalia that comported his rank. This digression upon the rôle which the chamber used to play, in spite of its curious and interesting side, is a little too long.

In the sixteenth century, the separation between the spare chamber and the ordinary chamber disappeared—at court, at least, where the kings and queens used to admit a crowd of courtiers at their awakening or their rising from bed. Everybody knows how important in the time of Louis XIV was held the favor of being present at the rising or couching of the king. This singular promiscuousness brought about a transformation in the furnishing of the chamber: there was first the "*ruelle*," a free space arranged under the curtains and draperies between the bed and the wall; then the "alcove," which was imported from Spain, but which was not at this epoch the recess to which we have since given this name. The alcove at that time consisted of columns and balustrades, which divided the chamber into two unequal parts: in the smallest was the bed, the prie-dieu, some chairs, etc. Then follows a rehabilitation after the most authentic documents relating to the furniture and the arrangements of the chambers of a certain number of illustrious personages, lords and ladies: Jeanne de Bourgogne (1316); Queen Clemence of Hungary (1328); Marie de Bourgogne, countess of Cleves (1425); Louise of Savoy (1525); Catharine de Medici (1589); Gabriel Destrées, Madame de Maintenon, Madame de Pompadour, etc.; and on the masculine side, Louis XIV and Louis XV. The list is a long one. These names give opportunity for very interesting historical and anecdotic details, but the author stops suddenly, and it is only by three engravings, representing a chamber under the Restoration, that of Mlle. Mars, a celebrated actress, and that of the Empress Eugenie at St. Cloud, that one can derive some contemporaneous instruction which gives opportunity for comparisons of much interest.

We see by these two examples that practical questions have been set aside. Under the article "Assemblage" we find, it is true, what is a mortise and tenon joint and what a dove-tail joint, but with this exception such articles are rare and they are also treated very briefly. It is always the anecdotic side which receives most attention. We learn, for instance, that elevators, which are generally believed to be of recent invention, have been employed in houses for more than two centuries. They were in use in 1660 at the court of Savoy. This apparatus was introduced in France by the Sieur Villayer, a man full of invention and much intelligence. Says St. Simon, "It is he who invented those *chaises volantes*, which by their counterpoise of weight rise and descend between two walls to the story where one wishes to go while seated within. Madame la Duchesse, the king's daughter, wished to have one for her entresol at Versailles. Wishing one evening to ascend, the machine stopped short half-way up, so that before they heard her screams and could release her by breaking through the walls, she remained there a good three hours. This mishap caused the apparatus to pass out of fashion."

In fine, the "*Dictionary of Furniture and Decoration*" is a work carefully done from every point of view. We only incline to complain that it embraces too long a period of time for the author to be able, in four volumes, to treat all the articles, taking care to preserve their relative importance and interest, in a complete and equal fashion. Such as it is, nevertheless, there may be found in it curious, interesting and, especially, exact information. It is only fair to add that the author and publishers recognize the obligation in which they may be placed of exceeding the number of pages or volumes prearranged, which would not, however, bring about any augmentation of the price of the work to the subscribers.

The illustrations are carefully made, and the drawings are scrupulously exact. As to the full-page plates, the greater part are in color and have been reproduced by a new process of chromo-typography. There will be sixty-four of these for each volume, or, at least, two hundred and fifty-six for the entire work.

ARCHÆOLOGICAL NOTES.

ROME, January 17, 1888.

Store at Buffalo. I. H. Kent, Architect.

THE controversy raised among the archæologists by the finding at Rome of a chapel (*sacrarius*) dedicated to the worship of Mithras is not yet exhausted. This important discovery was made in the vicinity of Termini under the constructions which, according to the inscriptions, belonged to the Nummi-Albini family.

Without pretending to settle the controversy, I will state the principal elements of it. The existence of the worship of Mithras at Rome was already proved by several other objects. In 1864, some fragments relating to this Persian divinity were exhumed at Ostia, at the mouth of the Tiber, in the buildings of Pius Antonius. The Mithriac had even cleared the walls of the ancient metropolis of paganism before Christianity had definitely supplanted it, towards the third or fourth century of our era, and positive traces of it have been found at several other points of Europe, notably in Transylvania and ancient Germany. Some doubts still existed as to the real character of the Asiatic myth. The Greeks and Romans believed that Mithras symbolized love as the principle of fecundity and procreation which perpetuates the living world.

The painting that ornaments the recently-found chapel will aid us to settle the opinions on this subject. This painting represents the taurobolium. Mithras seizes with the left hand the victim's nostrils, whilst with the knees he keeps down the body as though he wished to master it. The right arm, which probably held a dagger for the killing, has been worn off by time. All that we see are the hind legs and a part of the back of the dog representing Sirius, guardian of the heavens and regulator of the year, but we divine by the posture of the legs that the dog leans towards the wound of the sacrificed beast in order to lick his blood. The bull's tail, although besmeared with earth, appears to be still ornamented with a bunch of spike, symbol of the year's fertility. On each side of Mithras there are two torch-bearers, one holding his flambeau turned towards the ground, while the other raises his to heaven.

Mr. Capannari, who has written a great deal about this highly important archæological object, and who has just died greatly regretted by the scientific world, saw in the lampadaire's different postures an allusion to the spring and autumn equinoxes, which mark the sun's coming and departure. Mithras wears the Phrygian miter and the red mantle (caudys). According to Mr. Capannari's interpretation, the Greek and Roman idea of Mithras, which made him the incarnation of the sun, was the true one, but this eminent

archæologist expressed the opinion simply as an hypothesis and certainly had no pretension of having closed the debate that has so long agitated learned societies.

Here is a list of the latest discoveries made by the Italian excavating committee:

At Rome an inscription has been found in the Cœlian Hill which probably has some connection with the epoch of the reëstablishment of the colleges, in virtue of the Claudian law of the year 696. In the neighborhood of the Via Cavour they have unearthed a fragment relating to the restorations made by order of Flavius Philip of a nymphœa existing in that quarter.

At Tivoli a Hercules has been found in a well-preserved state. By its elegance and the finish of its forms it belongs to one of the best epochs of Roman art.

In an old Capuchin convent near Verona, a collection of wine amphoras has been discovered, and some of the vessels still contained a pitchy liquid, whilst a fragment of polychromatic mosaic is reported from the vicinity of Policelle, on the Po.

The Superintendent of Excavations at Bologna reports an important discovery in the shape of a series of sepulchres of the first Christian epoch, some of which belong to persons of distinction, to judge by the richness of the accessories with which they were ornamented.

But it is above all in the Etruscan region that the researches have given excellent results. In the Bolesena and Orvieto zone, as well as in the neighborhood of Arezzo and Civita Vecchia, some very profitable excavations have been made; a great number of tombs have already been dug out, and it has been shown that the Etruscan burial places were much more extensive than has hitherto been supposed. The objects discovered have not yet been definitely catalogued, for they relate to an uncertain and little known historical epoch. The archæologists are not yet agreed upon the various periods of Etruscan art, and the objects that are ordinarily founp in the tombs, such as arms, amphoras, lamps, cups, jewels and other accessories, give only insufficient indications of the periods to which they should be attributed, although the degree of nicety and the perfection of the artistic embellishments may generally be considered as characteristic of certain centuries.

H. M.

WATER-COLORS BY JOSEPH LINDON SMITH AT THE BOSTON MUSEUM OF FINE ARTS.

THERE is now, and will continue to be until February 22d, an exhibition of water-colors by Mr. Joseph Lindon Smith at the Museum of Fine Arts, which is more worthy of attention than the work usually brought to the notice of the public. There are some sixty numbers in all, the larger part of architectural subjects, though there are many pencil studies from old masters and from life and several landscapes. The work is that of a painter, not of an architect, as is manifest by the facility of the technique and by the attention devoted to the varying tones and delicate tints with which time clothes architecture, in contradistinction to the clearness of outline and of light and shade which to an architect appear paramount. Not that purity of outline or that chiaroscuro are at all lacking in these drawings; on the contrary, they are wonderfully rendered, but that the painter leaves out nothing, while the architect usually forgets the accidentals, and by so doing becomes more topographical and less interesting except to his own ilk. It is the fact that these water-colors render *everything* that makes them so remarkable — everything in the best sense of the word, not only drawing, color, sense of material, but that much better thing, the spirit and quality of the thing portrayed. The technique is certainly eclectic. It shows no strong leaning to any school. There may be a taste of the Paris atelier, but it is slight. There is a suggestion of the methods of the devotees of Ruskin, but the work has much more vigor than the emasculated productions of those disciples. Whenever a copy is made from an old master, the quality of that master is wonderfully reproduced. Here is evidently a man with his eyes and his heart open to be impressed and a hand skilful to record the impression, and yet he is not an impressionist (so called). The drawing is exact, yet without dryness, and is absolute in its fidelity in most cases. We remember going to the London water-color exhibition on Bond Street a year or two ago and coming away with a dreary distaste for painfully-labored, bloodless inanities, and then going into an Exhibition of American water-colors a few doors farther on and coming out with an irritation at badly-drawn specious cleverness.

These works of Mr. Smith belong to neither of these classes. They are skilful in drawing, beautiful in color and show a mastery of technique.

It is hardly in our province to speak of anything except the architectural work, but we cannot resist the temptation of calling attention to No. 7, a pencil study of Rubens, "Chapeau de Paille," and the pencil studies Nos. 18 and 46 after Rubens, No. 26 after Holbein, No. 32 after Velasquez. In as few lines as possible, with but little shadow, and with a peculiar softness and richness of touch, these studies render the fleshiness and color of Rubens, the restraint and austerity of Holbein, the breadth and vigor of Velasquez.

In a remarkable way, No. 10 — a small color study of Bonafagios, "Lazarus at the House of Dives," in the Academie dei Belle Arti in Venice — gives an excellent sense of one of the most wonderfully colored canvasses in the world. The portrait of a choir-boy in oils, has the simplicity and quietness of key of color of an old master.

Of the architectural work, which gives the warmth of Venetian, Italian color with its co-existent delicacy, not with the garish brutalities so prevalent in Venetian views, No. 31, west front of the Cathedral, Verona, is one most worthy of notice. The quality of the stone in reflected light (the subject was painted with the light reflected from the pavement of the piazza), the stained surfaces, the rich glow of Verona marble are all expressed in a masterly manner. This glory of color, this wealth of opalescence is produced from a very limited palette, only four colors being used, *i. e.*, cyanine, aureolin, yellow ochre, rose madder, with Chinese white as a vehicle at times, when the chalky bloom on the surface of marble was desired. This subtile commingling of four colors prevents the possibility of a crude tone. No. 18 — "Archway," S. Toma, Venice, in which the detail of the arch is beautifully drawn. Nos. 21 and 28, "Studies of Venetian Arches," with the most delicate subtility of line and gradation of color. Nos. 2, 3 and 4, "Venetian Wells," with very able drawing, the character of the carving of each type felt *for* each type. Besides these, No. 30 has fine drawing and delicacy almost reverence of touch, and the capitals to the pedestal of the Colleoni statue, No 20, are exquisitely drawn. This is only a hasty survey of the work and inadequate in its analysis, but that the work is of unusual character, is manifest at once upon seeing it.

COMMUNICATIONS

THE DECORATION OF McVICKER'S THEATRE, CHICAGO.

CHICAGO, ILL., February, 1, 1888.

To the Editors of the American Architect: —

Dear Sirs, — We are led to reply to Mr. Twyman's note in your issue of January 28, solely for these reasons: First, to relieve Mr. Blackall from the embarrassment of an apparently false position; second, to protect ourselves and our profession. For we feel that such irresponsible statements, allowed to go unanswered, cannot be otherwise than detrimental generally to those of us with whom architecture is a loved and cherished art.

We beg, therefore, to say, that Mr. Blackall is thoroughly right in his statement that the decorative work in McVicker's Theatre, Chicago, was executed from our designs; and Mr. Twyman is thoroughly in error when he claims credit for the same. In Mr. Twyman's statement, however, there is a faint suggestion of truth which will be clearly understood, we think, when it is made known how Mr. Twyman, who, at the time of the remodelling of McVicker's Theatre, was a salesman in charge of the retail wall-paper and interior-decorations department of the extensive wall-paper house of John J. McGrath, Chicago, plays upon the meaning of the word decoration.

The architectural treatment of the interior of McVicker's Theatre is based upon a single consistent scheme or plan which is differentiated into form, color and illumination. The transitions and interblendings are subtile; and we deem it evident to the critical observer that the conception is identical throughout form, color and illumination.

The decorations, as we understand the term, take their origin in certain changes of form initiated in the constructive subdivisions of the design. This tendency toward change gathers increased definiteness as it passes through certain geometrical ramifications, and, taking on swiftly but without abruptness an organic semblance, culminates finally in intricate and involved folliation and efflorescence. Within this work, and incidental thereto, are placed the bulbs of the incandescent system of illumination. This method of treatment applies to the proscenium with its large sounding-board and twelve boxes: the whole converging toward the stage-opening and elaborately framing the same. It applies also to the main entrance vestibules. For this part of the work we not only made the designs, but we furnished carefully worked-out full-size details, even for the foliated work, which were most faithfully and without the slightest deviation carried into execution by James Legge, the carver, with whom the contract for the same was placed. Inasmuch as this work, executed in plaster, was completed, stored and covered by an insurance policy prior to our entertaining the idea of asking sketches and bids for color decoration from decorative concerns, it is manifest that neither Mr. Twyman's conception nor handiwork nor supervision entered into this part of our operations.

Considerations of economy necessitated that the remainder of the auditorium and its appendages should be treated very simply, we, therefore, at the time the general contracts were let, did no more as regards appearances, in addition to the purely utilitarian and acoustic handling, than to definitely determine the number and approximately the location of the electric-light bulbs and the inlets for the supply of fresh air for the fans.

When the time approached that the contract for color decoration should be considered, we began anxiously and carefully to think of the coloration, for it became distressingly evident that the delicate rythms and modulations of the plaster ornamenation, now in place,

would be deprived of their sequence, significance and context by an inadequate or bizarre scheme of applied color. Gradually then arose the conviction that the structural, the geometrical and the foliated parts could not be given relative color values which should differ essentially from their relative solid values, lest, through false accentuation the equilibrium and repose of the single simple idea or impulse underlying the conception be disturbed, and thwarted of its full expression. From this sense of balance followed logically the belief that these parts should be in close and delicate self-tones; and, finally, the determination that the principle of gradual and smooth change carried out in the design should also be the dominant idea in coloring. Upon reaching this decision, or rather, as it would seem, reverting to the original conception of the whole, we made known our idea and wishes to Mr. Twyman and to other decorators, and asked them for sketches covering the unfinished parts above referred to, and for schemes and prices for the color-work of the whole. Mr. Twyman was the only one of these who submitted a proposal in accordance with our suggestion (the choice of color as between many desirable and befitting ones was left open). His choice of color and treatment was in the main sympathetic with our architectural treatment, and to him, or, rather to his principal, John J. McGrath, the contract was awarded. Here, then, we begin to discern the first awaking of Mr. Twyman's conception. Let us progress a step nearer to it.

Mr. Twyman proposed to use for the wall-covering a wall-paper which we had designed, full-size, for Mr. McGrath some two years previously. The pattern of this paper required six or seven blocks twenty inches square for its development, and as it had the characteristic movement we were glad to use it in this house. Mr. Twyman proposed to heavily flock the pattern, and to add a raised rosette to the centre of the flower. This suggestion was accepted. To use this paper was Mr. Twyman's own thought: we had utterly forgotten its existence.

There now remains for examination only the flat part of the main ceiling, the ceiling under the gallery and under the balcony, and the *foyers* and retiring-rooms, which are small. For these were required flat treatment in paper, bits of *papier-maché* foliated work at the electric-bulbs, and the limited amount of stencilling called for by Mr. Twyman's sketches. In actual execution, these forms seem to us, as they must to any skilful and discerning eye, to possess that peculiar suggestion of caricature that the ear notes in the speech of a foreigner uttering our native language neither grammatically, musically, nor with deft and rythmic enunciation. The plastic forms here are Mr. Legge's execution of an already beheaded conception, which, in that condition, is assuredly the exclusive property of Mr. Twyman. The stencil patterns were carried out full-size by the foreman on the work. The great pressure and rush of the whole undertaking toward completion, unfortunately made it impossible for us to give the time to a revision of these designs.

As to Mr. Twyman's statement, "The work was executed under my charge and dictation, and was my own conception without control of architect or owner," this is manifestly absurd; for the work was done under our regular form of contract. This contract was between John J. McGrath and J. H. McVicker as principals, and contained the customary stringent clauses regarding the supervision and rejection of work by the architects, payment upon acceptance and certificate, etc. These powers were used. Mr. Twyman represented his principal at the building in the capacity of overseer or superintendent, or what-not, or as what is known in the trade parlance of these houses as their "artist."

This is a correct statement of the case. How, then, shall we understand the full scope and content of Mr. Twyman's connection with this work otherwise than by applying to the language of his note his evident "conception" of the meanings of English words.

Very truly yours, Adler & Sullivan.

BAND-SAWS FOR LARGE LOGS.

Mishawaka, Ind., Feb. 1, 1888.

To the Editors of the American Architect:—

Dear Sirs,—In connection with your item about California Redwood, *American Architect*, January 28, it may be of interest to you to know that Lonaon, Berry & Orton of Philadelphia are building band-saw machines capable of sawing redwood logs ten feet in diameter.

Respectfully, R. D. O. Smith.

TESTING FOR THE FOUNDATION OF THE CONGRESSIONAL LIBRARY.

Cleveland, O., Feb. 6, 1888.

To the Editors of the American Architect:—

Dear Sirs,—As I have just finished Mr. Smithmeyer's article in the last number of your journal, I would like to occupy enough of your valuable space to say a few words more upon the subject. My sketch was made from memory as Mr. Smithmeyer suggests, but with the exception of the movable car I do not see but that it was substantially correct. Unless my memory utterly fails me, the track upon which the car runs rested upon either six or eight pedestals, although the car was directly over four of them. Also the pig-lead was piled much higher on one corner of the platform than elsewhere. My idea of the apparatus was that it was intended to ascertain the load that a square foot of the soil would carry for a constant settlement, and not as I find it, to determine the amount of settlement for a constant load. For the first of these purposes I think that my objections would hold. As it had been raining all day when I visited the site, I obtained a very good idea of the character of the soil from the large amount of it which accompanied me upon my departure. Thanking Mr. Smithmeyer for the courtesy of his answer and hoping that he will understand that I was not responsible for the heading of my communication, I remain very respectfully yours,

Clarence O. Arey.

THE ALBANY ASSEMBLY-CHAMBER VAULT.

New York, Feb. 7, 1888.

To the Editors of the American Architect:—

Dear Sirs,—I beg leave to direct your attention to the report of the experts who a few days ago advised the immediate tearing down of the vaulting of the Assembly Chamber at the Albany Capitol. My researches into the matter issued in your paper October 29, 1881, and March 29, 1884, having been fully justified in spite of all attacks, I should like to learn what steps you are going to take concerning this affair, which at all events should be used to show that science and truth are above political tricks and "bossism."

Truly yours, H. W. Fabian.

IRON CHURCHES.

New York, N. Y., February 7, 1888.

To the Editors of the American Architect:—

Dear Sirs,—In your issue of February 4, 1888, page 60, you suggest that I can give information as to the builders of iron churches, and add a supplementary paragraph of what a correspondent reports Ruskin as saying.

Will you be kind enough to state in your journal that the last iron church was erected in 1873, that not one has been built since, and that no one need apply to me for any further information relating to building iron churches. Very truly, Lawrence B. Valk.

NOTES AND CLIPPINGS

A Roman Sanatorium.—An important discovery has just been made at Susa, about six miles from Castelforte, which points to the conclusion that the Romans were acquainted with the use of mineral springs for medicinal purposes. The erection of new mineral baths is contemplated in that spot, and during the work of excavation the remains of what proved to be old Roman mineral baths have been met with. A road paved with Basaltic lava separates the two principal groups of buildings. To the left of this road, and leaning against the mountain side, is the bath for hot mineral springs. The atrium is entered, as in classic dwelling-houses, through a portal adorned with columns, its floor being laid in black and white mosaic, and its roof probably formerly supported by four columns. Between these columns is the impluvium, a square marble basin, round which are seats, which leads to the supposition that it was used for bathing purposes. In the middle of the impluvium a hollow marble column supported a smaller basin of alabaster, into which the water rose through the column, flowing over its edges into the large basin. The further wall of the atrium opens into a large hall; through its side walls corridors lead into chambers to the right and left, the use of which for bathing is indicated by the whole arrangement of water basins and a network of water conduits, some of which are placed in the walls. On the other side of the main road, with a view towards the river, two buildings are located, in front of which a row of columns with walled parapet probably inclosed a garden extending along the river bank. Between the two buildings, containing rooms of various sizes, all of which give into outer corridors surrounding them, a colonnade provided with seats has been erected. It is concluded that this group of buildings formed a hospitium or inn for the bathing guests—that is to say, a hostelry for those staying for their cure. The purpose of the whole establishment is also shown by the condition of the statuary in the atrium, which has been much injured by the mineral water. The sanatorium must have flourished for a long time, for, together with coins of Augustus's and Vespasian's time, Arabian and Norman gold coins have been found.—*Sanitary Record.*

The World's Deepest Wells.—The deepest well drilled in the United States is that of George Westinghouse, at Homewood near the city of Pittsburgh, which, on Dec. 1, 1886, had reached a depth of 4,618 feet, when the tools were lost and drilling ceased. The Buchanan Farm well of the Niagara Oil Company, drilled by Frederick Crocker in Hopewell township, Washington county, is 4,303 feet deep. The Rush Well of the Niagara Oil Company in Washington county was abandoned at 3,300 feet. The deep well of Jonathan Watson, near Titusville, was drilled about 2,500 feet. J. M. Guffey & Co's well on the Walz farm at West Newton, Westmoreland County, was drilled to a depth of 3,500 feet. The well of Isaac Willets at Sargent's Mills, near Sycamore, in Greene county, was abandoned at 3,008 feet. The deepest bore hole in Europe is at Schladebach, near Kotschau station, on the railway between Corbetha and Leipzig, and was undertaken by the Prussian Government in search for coal. The apparatus used is a diamond drill down the hollow

shaft of which water is forced rising again to the surface outside the shaft ef the drill and inside the tube in which the drill works. By this methed ceres of about fifty feet in length have been obtained. The average length bored in twenty-four hours is from twenty to thirty-three feet, but under favorable circumstances as much as 180 feet has been bored in that time. Other deep holes are as follows:

	Feet.
Domnitz, near Wettin	3,287
Probat-Jesar, Mecklenberg	3,957
Sperenberg, near Zossen	4,176
Unseburg, near Stassfurt	4,242
Lieth-Elmshorn, Holstein	4,390
Schladebach	4,515

— *The Progressive Age.*

Brick and Stone Bridges of Large Span. — According to Professor E. Dietrich, ef Berlin, there are only fifty-seven bridges, of brick or stone existing having a span greater than 131 feet. Forty ef these have spans lying between 131 feet and 164 feet, ten have spans ef from 164 feet and 200 feet, three of from 200 feet to 230 feet, and one only, the Cabin John Bridge, near Washington, exceeds this limit, and has a span ef 237 feet. Thirty of these are road and twenty-two are railway bridges; one carries a canal, another a conduit, and three are not classified. Fourteen of them date from before the commencement ef the present century, twenty-two were built between the years 1800 and 1860, five between 1860 and 1870, six between 1870 and 1880, and since then ten have been erected. In twenty-two of the bridges the rise lies between half and one-third of the span, in eighteen between one-third and one-fourth the span, in ten between one-fourth and one-fifth the span, and in six between one-fifth and one-eighth the span. One bridge only, a road bridge in Turin, has a flatter arch than given by the smallest of the above ratios, and in this case the rise is $\frac{1}{8.18}$ the radius at the crown lies in fifteen cases between 66 feet and 98 feet, in eight between 98 feet and 131 feet, in eleven between 131 feet and 164 feet, and in three cases between 164 feet and 187 feet 8½ inches, the latter being the radius at the crown of the Devil's Bridge at Bevizzo. Italy. The ratie of the arch at the crewn to its radius at the same peint is in thirty bridges between one-tenth and one-twentieth, in ten between one-twentieth and one thirtieth, and in eight between one-thirtieth and one-thirty-fifth. In all the railway bridges this ratio lies between one-twentieth and one-thirtieth, the smaller fractions being solely cenfined to road bridges. Twenty-seven of the bridges are situated in France, thirteen in Italy, ten in England, two in Austria, twe in Spain, and one each in Germany, Switzerland, and the United States. — *Engineering.*

A Bit of Chelsea. — Speaking of the Chelsea china factories, the Lendon *Standard* says: "Time was when enthusiasts used to wait their turns fer the crockery as it came out of the evens, and Gay made merry over the lady whose rest could be breken by 'A cup, a plate, a dish, a bowl; China's the passien of her soul.' Even Dr. Johnson was affected by the prevailing mania, and not only bought the wares, but tried to fashion them himself. Yet, in spite of the furer for 'Chelsea,' and the high prices paid for it, the factory closed its doors, to the amazement of the public, who explained it by saying the porcelain people got their clay from the Chinese, who, when they found out the use made of it, refused to let the captains any longer ballast their ships with the precious material. Some of the Chelsea works of art were quite equal to the best of Sèvres ware, and newadays they command prices which Sèvres does not always reach. In 1879, a tea-service painted with exotic birds brought nearly £900, the milk-jug alene selling for £71 8s, or about five times its weight in gold. Even the cups and saucers were sold at figures varying from £40 to £60 the pair. A vase two feet high brought £566; and at another sale, three little vases were disposed of for £1300. The late Lord Dudley bought the Chesterfield vase for £2000, and one which had stood for 100 years in the Foundling Hospital for a sum net much less."

Adventure of a "Steeple Jack." — A singular accident occurred at Slaithwaite, near Huddersfield, County of Yorkshire, England, on Saturday, which for the time caused a goed deal of excitement. A very extensive cotton-mill has been erected for the Slaithwaite Spinning Company, and on Saturday, December 31st last, the chimney, which reaches to a height of one hundred and eighty feet, was so far completed that a "Steeple Jack" from Huddersfield was engaged to fix the lightning-conductor and remove the scaffolding which had been used to complete the chimney-top, round which there is a very wide parapet. The "Steeple Jack" successfully removed the scaffolding and was about to make preparations for his descent when the rope by which he was to descend somehow became detached and fell to the ground. The man was left on the chimney top. Soon a large crowd of persons assembled and they were for a time somewhat puzzled to know how he was to get down. The "Steeple Jack" was equal to the occasion and while the people were wondering how it was to be done, he sat busily engaged in unravelling one of his stockings, and when this work was completed, he let down one end of his thread and in course of time was provided with a rope sufficiently strong to let himself down by.

Moving the New York Capitol to Troy. — No; the State must look elsewhere for a spot whereon to erect a new capitol, one which can be sure of its foothold and its roof-tree alike. Our suggestion, made in all modesty, is, that the "monumental folly" be taken down, a portion of the stones transported to Troy, a building erected here for State Government purposes at the cost of $1,000,000 or $5,000,000, and the rest of the material sold to meet the expense. We are not sure but that such a sale of the left-over material would be more than sufficient to foot every bill and leave a surplus equal to the public debt of the State. — *Troy Times.*

Reappearance of a Submerged Chinese City. — The city of Naiyen, north of Ningpo, which was submerged about 1000 years ago, has recently been exposed to view and a number of vases, plates and other utensils of the Sough dynasty have been recovered by the natives.

TRADE SURVEYS

If there are any influences at work in American and European trade and manufacturing circles to decrease the volume of business or the output of mills, mines or factories, or the traffic of railroads or of ocean tonnage, they are not on the surface. In fact, there is no broad-guage reason to be given why any decline in activity of any kind should take place. Those who are using microscopes to discover evidences of worm-eating going on in the foundation timbers of our business structure have been unable to find them. There is no dry-rot in progress. A good ventilation is maintained throughout the entire business structure from the basement to the finial. In fact, there is nothing going on or there is no growth possible that should obstruct the natural and orderly development of this nation or any other nation. and the wisdom theoretical and practical, which is the common property of all, will prevent the growth of evils which could bring about distressing results. In short, business is good, trade picking up month by month and year by year, manufacturing and railroad-building enterprises are increasing, and developments of all kinds are feeding on healthy material. There is nothing to alarm, but there is a great deal of work which calls for the highest order of business and commercial management. One of the strongest, and at the same time weakest points within our reach, is the abundant supply of money. That abundance if rightly used will swell the volume of business and strengthen the body politic in every fibre. If it is wrongly used, it will create paralysis and congestion or some ether evil that will not be likely gotten rid of. Taking a brief sweeping survey of the various industries, we find the facts to-day to be about these. Architects in all our larger cities are not overcrowded with work but are busy. Builders in cities and towns are making extensive preparations for a year's activity, and they are buying to cover contract work already given. Their purchases cover iron, steel, lumber, stone, slate, glass, paper and everything used in the completion of our better class of building work. Those who have given particular attention to heavy work, such as bridge-building, heavy warehouse work, railroad work and the like, as well as engineering jobs, are nearly all in a good frame of mind over the requirements that have already been brought to their attention, and prospects for employment in the prosecution of heavy enterprises in all sections of the country. References have been beretofore made to the prospects of a number of important engineering enterprises, and every week brings out one or two more that will probably be prosecuted. It is impossible to say at this writing, with any certainty, as to what railroad-building will be done this year. Two weeks ago the hope was indulged in by many writers that the dead-lock between buyers and sellers of rails was broken, and that orders for one-half million or more tons would be crowded in. Up to this time only a half dozen roads have bought, and these mainly for trifling requirements, such as repairing or extensions. No contracts have, as yet, been placed for big work, such as for the construction of a trans-continental line or for any parallel reads. But we know there are several enterprises of this kind which have passed the ordeal of Wall Street. That is funds have been promised, bonds have been sold or are selling, and everything is being put in readiness for construction. The rail-mills have very little work in hand, and by the time spring opens they will be in a starving condition for business. The theory of railroad builders and rail-buyers is, that by that time the rail-makers will have reasons for accepting $30 to $30.50 as the bottom mill prices in Eastern Pennsylvania. All other branches of the iron trade are fairly active, excepting the pipe-makers. It is rather strange that this industry should be dull considering the facts and possibilities in store for transporting natural gas for domestic and manufacing purposes. Car, locomotive and ship and boat-building will be very actively prosecuted all this season. Our advices up to within a few days show that nearly all yards along the coast and in the interior are pretty well loaded up with orders. Further discouraging news is received from a number of Western implement works. A few have been sold out, quite a number are working half time, but the stronger will survive. The industry will, in a few months, probably, be upon a stronger foundation. It has been overdone, and, naturally, a reaction will take place. The lumber trade is remarkably active this winter. Loggers in the Northwest thus far have been unable to bring out the usual percentage of logs, and this fact is being used as an argument in favor of higher prices next year, but the winter is not yet over, and the makers will, no doubt, have the usual supply on hand for the spring. Hard woods will be in abundant demand. Several new Southern woods are coming in. Sap-pine is taking the place of cherry. Yellow-pine is, to a considerable extent, taking the place of hard woods. Walnut is not in demand. Cherry, ash and poplar hold their own. The Western yards are pretty well supplied, and buyers, as a rule, are deferring the placing of large contracts until a little later. The possibility of a strike in the Wyoming coal region has put up prices 25 cents a ton. A further advance will take place within a week should the probabilities of a strike increase. The industries depending upon anthracite coal have not suffered excepting in isolated cases. The output of coke has been reduced, and two strong syndicates now control the entire Western Pennsylvania production. The bituminous coal production will be considerably increased this season by the extension of short lines of railroad into nearby coal-bearing territory. The commercial situation is very good, although the volume of business is below last January. Conditions are such that an increase in the volume of trade can be relied upon. Stocks are low in nearly all markets. Textile production is maintained at high points in all kinds of cotton goods. In woollen goods the prospects are better. In hosiery foreign competition is still causing a good deal of trouble. Money is seeking investment where it is safe. Speculation is doing but little mischief. Congress is playing with the tariff question, labor troubles, the surplus questinn and two or three others. The Third House has given it out that nothing will be done to jeopardize existing arrangements. In labor matters the striking miners at Philadelphia, the carpenters at Pittsburgh. the building trades at Chicago and some classes of labor in Cincinnati are causing a little anxiety to many employers as to friendly relations during the spring. In other cities labor organizations are discussing hours of labor and rates of wages, but advices from several authorities go to show that labor difficulties will diminish rather than increase during the next sixty days. Labor, as a whole, is anxious to arrive at an understanding and stick to it through the year.

S. J. Parkhill & Co., Printers, Boston.

THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. XXIII. Copyright, 1888, by TICKNOR & COMPANY, Boston, Mass. No. 634.

FEBRUARY 18, 1888.

Entered at the Post-Office at Boston as second-class matter.

CONTENTS.

OUR Boston readers will hear with great regret of the death of one of the most prominent architects of that city, Mr. John H. Sturgis. Mr. Sturgis was the second son of the late Russell Sturgis of London, who was first the American partner, and afterwards the head, of the great mercantile and banking house of Baring Brothers, and spent his early life in England. As a young man, he travelled extensively in various parts of the world, and finally, after pursuing a suitable course of study in London, came to America where he had many relatives, and established himself as an architect in Boston. Here he soon gained a high reputation in the profession for his conscientious and thorough construction, and the peculiarly solid and satisfying character of his designs, while he was universally esteemed for his sincere and manly character, and rapidly built up a large practice. Besides many private houses, he, either alone, or in association with Mr. Charles Brigham, who was his partner for many years, designed and executed the building of the Boston Museum of Fine Arts, that of the Boston Young Men's Christian Association, several business structures, the Church of the Advent, and the new Athletic Club. We think that he always spent Christmas at his father's house in England, and even after he had become engrossed in the cares of an extensive business and a growing family, he found time to keep up close relations with his old home, frequently bringing back from England some novel material or method of building. To his efforts in this way is undoubtedly due the early introduction of terra-cotta as a material into this country. At the time of the somewhat celebrated competition for the Boston Museum of Fine Arts, the buildings of the South Kensington Museum in London, then, as they still are, among the best examples in the world of terra-cotta architecture, had just been completed by General Scott; and Mr. Sturgis caught from the English architects their enthusiasm over the new material. His success in the Boston competition gave him just the opportunity he desired, and, as no one in this country knew anything practically about the making of terra-cotta, the details of the Art Museum were executed in England by the Messrs. Blashfield, from Mr. Sturgis's drawings and set in place, on their arrival here, under the supervision of Mr. Taylor, who was sent from England for the purpose, and after his work was accomplished, remained in America, where he was instrumental in the formation of several of the terra-cotta manufacturing companies which have since been so successful here. Besides terra-cotta, Mr. Sturgis introduced at the same time the selenitic cement invented by General Scott, and used it somewhat extensively in the Art Museum building. Like all thorough architects, he was fond of experimenting with new materials, and as he enjoyed nothing so much as solid and sincere construction, his buildings were not only unusually interesting, but have undoubtedly exerted a very beneficial influence upon the architecture of Eastern Massachusetts. The Church of the Advent, for example, although similar in construction to many modern English Churches, was the first that had been built in or near Boston with the brick and stone work showing frankly inside; and it produced a strong impression, both in the profession and among the public. In his management of detail, Mr. Sturgis was as careful and successful as in his other work. The richest of his buildings in this respect is the Art Museum, but the most beautiful single examples, to our mind, are to be found in the house of Mr. Ames, on the corner of Commonwealth Avenue and Dartmouth Street, which possesses a wrought-iron gate, and some carved exterior panels, which are not surpassed by anything that we know of in this country, and by very few pieces of modern work anywhere. Of late years, Mr. Sturgis's energy has been compelled to struggle against repeated attacks of painful disease. A few months ago, while barely convalescent from a long and severe illness, he was summoned to the bedside of his dying father in England. The exertion and anxiety of the long journey and the days which followed it were too much for his imperfectly restored health, and soon after his father's death he was again prostrated. This last attack was so serious that his family was sent for from Boston, and he expired at Saint-Leonard's-on-Sea, with his beloved wife and children beside him. In the profession he will be greatly missed. Although not very far advanced in middle life, he had been for many years Vice-President of the Boston Society of Architects, and was always a wise, as well as kind and manly counsellor. If anything needed to be done for the good of the Society, he was always ready to devote his time and energy to it, and whatever he undertook was sure to be well done. His failing health was of late years a constant subject of regretful comment and inquiry among his fellows, and his death will be to them a painful shock.

SOME time ago misled by the announcement in the American newspapers, almost on the same day, of the death both of Mr. E. W. Godwin, the lamented architect and artist who was fifteen years ago so conspicuous a figure in professional life in England, and of Mr. George Godwin, the no less distinguished editor of the *Builder*, we published an obituary notice of both. Later advices showed that there had been a confusion of names in the telegraphic advices, and that Mr. George Godwin was still spared to complete his useful life. Within a few days the news has come that he, too, has passed away full of years and honor. We have at present nothing to add to our previous account of his life except renewed expressions of regret at the loss which the profession has suffered. Later, when the English journals come to hand, we shall undoubtedly find some interesting details of a career so efficient and honorable.

MR. GEORGE R. TOLMAN, the hero, as we may call him, of the rather celebrated Tolman-Phelps cases in Washington, calls our attention to several inaccuracies, in our account of those cases in our issue for November 7 last, besides giving further details. The origin of the affair seems to have been a misunderstanding. The architect asked his client, by letter, for a payment on account. The client, Captain Phelps, sent him half what he asked for. The architect sent a message back, asking for the full sum. Nothing could have been more innocent than the proceedings so far. As it happened, however, Mr. Tolman had occasion to send to Captain Phelps's building for a particular drawing which he wished to consult in his office. The foreman at the building, not being able to distinguish the drawing wished for, sent a large roll, saying that he should not need them immediately, and that Mr. Tolman might pick out what he wanted. The next morning Captain Phelps went to his building and missed the drawings, and was told that Mr. Tolman had them. Being of a peppery disposition, and possibly somewhat uneasy in conscience at having disappointed Mr. Tolman in the matter of the payment, he appears to have jumped at the conclusion that Mr. Tolman had carried off the drawings as a means of coercing him, and

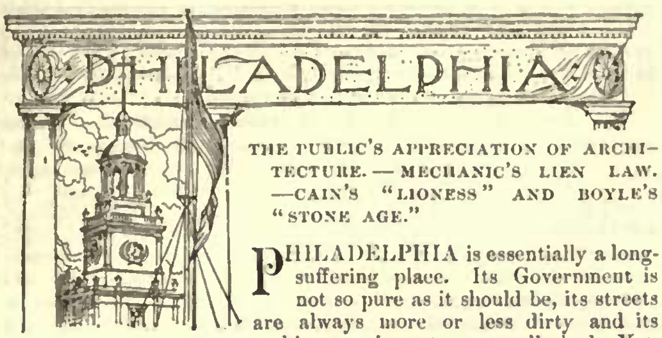
forthwith flew to the law for vengeance, entering a civil suit for damages for the retention of the plans, as well as a criminal suit for embezzling them. An officer was sent to seize them, but Mr. Tolman very naturally refused to give them up; and he was soon after arrested on the criminal complaint and locked up over night, the bail laws in the District of Columbia being peculiar. The matter then came into the courts. The first case tried was that of Phelps *versus* Tolman, for damages for retention of plans, and the jury gave a verdict for Captain Phelps for one cent and costs. The next case was that of Tolman *versus* Phelps, for compensation for services. The jury awarded the architect two hundred dollars and costs. The judge ruled that Tolman could claim nothing for the work represented by the plans in his possession, although they seem to have come back into his possession against his wish. If it had not been for this ruling, the verdict of the jury would probably have been for about twelve hundred dollars instead of two hundred. The last case tried was that of Tolman *versus* Phelps for false and malicious imprisonment. Phelps's case against Tolman for embezzlement of plans having been discreetly dropped long before; and in this the jury awarded Mr. Tolman five hundred dollars damages for his night in the station-house. Mr. Tolman, it is hardly necessary to say, won, besides, the sympathy of the whole profession in his unmerited trouble, but, as he sensibly says, the circumstances were throughout so peculiar that his case can hardly serve as a precedent.

THE *Engineering and Building Record* gives an admirable abstract of the paper read by Lieutenant C. C. Rogers, U. S. N., before the annual meeting of the American Society of Civil Engineers, last month, which presents the most sensible and most recent view of the enterprise that has yet been made public. Lieutenant Rogers happened to be stationed at Aspinwall in the United States ship "*Galena*" during the months of March and April of last year. Just before the arrival of the ship at Aspinwall, M. Charles de Lesseps, with other high officials of the Canal Company, had reached the same port on their way to inspect the work on the canal, and Lieutenant Rogers, on calling upon these gentlemen with the request to be allowed to visit the works, was kindly invited to accompany the official party in its tour. He accepted the invitation and in this way saw every foot of the canal and the auxiliary works, besides inspecting the hospitals and barracks and acquiring an immense amount of information from those best able to furnish it in regard to the organization and administration of the undertaking, during a tour which lasted nearly three weeks. As is well known, the excavation of the canal is all contracted for, the work being divided into five sections, each of which is entrusted to a separate contractor, who is under heavy bonds to complete his work. It seems to be certain that the excavation has proved far more costly than was expected. To say nothing of the unusual physical difficulties encountered, the labor available has been both costly and bad, wages being very high, while the negroes, who do most of the work, are lazy and unreliable, and, as they rest entirely for three hours during the middle of the day, do not accomplish as much as would be expected from a laborer in a cooler climate, and the Canal Company, according to its own reports, has already spent more money than was originally estimated for the whole cost of the canal. With this, however, more than half the work has been accomplished, and the end may be considered already in sight. Many assertions have been made to the effect that the work on the canal was only just begun, and that it would soon be entirely abandoned, but the Columbian Government is not likely to be deceived, or to make rash advances of property to an expiring company, and it has, by official deed dated December 30th last, transferred to the Company the public lands, amounting to six hundred and twenty-five thousand acres, which, by the terms of the concession, were to be surrendered when one-half the total work necessary for the construction of the canal had been done. Up to the end of last year, the total expenditure had been about one hundred and eighty million dollars, one hundred and twenty-five millions of which have been for excavation. About one-third the excavation is done, but the machinery is ready for doing the rest, and it is tolerably certain that the whole can be completed for three hundred and seventy-five million dollars, but according to Lieutenant Rogers, it will be hardly possible to complete it in less than five or six years, even if the necessary money is raised.

M. CAMILLE FLAMMARION has recently published a little book on meteorological observations, from which *Le Génie Civil* makes some interesting extracts, on the subject, more particularly, of weather predictions. Most people know that a fall in the barometer indicates the approach of a storm, and a high barometer indicates fair weather; but more than this may, according to M. Flammarion, be learned from the mercury column. When, he says, clouds are to be seen moving in a long line, whatever may be the height of the barometer, it may be taken as certain that a depression, or storm centre exists in a direction which may be readily ascertained by facing in the direction in which the clouds are moving, and extending the left hand. On land, the position of the storm centre is of no great importance, except, perhaps, as showing whether it will cross a given locality, but at sea it is often possible for a captain, after finding in what direction the most violent part of a storm lies, to steer away from it, and soon bring his ship into pleasant weather. As to the distance and seriousness of the storm, something may be learned from the velocity with which the procession of clouds move; a severe and near storm being always indicated by a swift cloud movement, and a high barometer.

THE Fates seem to have a grudge against State Legislators. Hardly does the dust from the fall of one State Capitol subside before another is found to be in a dangerous condition, and the occupants are kept in a mild panic until something is done, or the building collapses. The dome of the Texas Capitol, about which there was much talk a few weeks ago, has been pronounced safe by experts, much to the relief of the citizens, but the Albany State-house, or rather the stone vault over the Assembly Chamber, has shown renewed signs of weakness, and the architect, with a commendable desire to prevent the possibility of injury to any person, even at some sacrifice of his own self-esteem, is said to have sent a formal warning against the further occupation of the Chamber. The groining ribs are said to show menacing cracks, while there have been dislocations in the neighboring rooms, so that the question seems to be now one of getting the vault taken down as safely and speedily as possible, and replacing it with something else. As architects, we cannot help regretting the loss of this bold and effective piece of construction. Few men in the profession in this country would have ventured to throw a groined vault in one span over a room sixty feet square, and Mr. Eidlitz's partial lack of success only serves to call attention more strongly to the immense difficulties which he had to overcome, and so nearly vanquished. A few days after the announcement of the necessity for a speedy change in the Albany ceiling came a story that the condition of the Massachusetts State-house was such as to cause serious alarm. Cracks had suddenly appeared in the plastering of the rooms, pilasters had started out from the walls, and everything seemed to indicate grave disorders somewhere about the building. Fortunately, the dome of the Boston State-house is only of wood, covered with tin, so that a sudden crash is hardly to be feared, but perhaps the symptoms indicate a disturbance all the more grave for occurring in so light a building.

A NEW fraud is described in the *Builder*, and some of our readers may be glad to have been forewarned when it reaches this side of the Atlantic, as it is likely to do before long. It seems that an ingenious individual advertised in the local newspapers in various parts of the country, inviting tenders for the erection of villas near some specified place in the vicinity of the place where the advertisement appeared, "under the provisions of the Boyle Trust." To insure good faith, a deposit of one pound was required from those wishing to tender, on receipt of which a copy of the plans and specifications would be sent them. As it happened, the Mayor of Leamington was one of those who were attracted by the advertisement, which certainly had a very innocent and attractive air. He sent his five dollars, as required, but, receiving no plans or specifications in return, began to be suspicious, and finally placed the matter in the hands of the police, who discovered and arrested the advertiser. On searching his room, no plans, specifications, or any other documents relating to the Boyle or any other trust were discovered, and as it was found that he had received numerous remittances from his dupes, an example was made of him by sending him to jail for a year.



THE PUBLIC'S APPRECIATION OF ARCHITECTURE. — MECHANIC'S LIEN LAW. — CAIN'S "LIONESS" AND BOYLE'S "STONE AGE."

PHILADELPHIA is essentially a long-suffering place. Its Government is not so pure as it should be, its streets are always more or less dirty and its architecture is pretty generally bad. Yet, when the election frauds become too gross or the streets are choked with filth, the easy-going public turns upon its "bosses" and drives them from place. To be sure, it is not always easy to persuade the people that the time has come for determined action, and it has happened more than once that individual citizens have hired a gang of laborers and had one or two of the chief streets cleaned from end to end. But, as a rule, when the people see that they are not getting what they are paying for, they shake off their apathy, reform as many abuses as they conveniently can, and for a while all is as it should be. With bad architecture the case is not so simple. The great mass of citizens do not know that it is bad, or those who suspect that the art is at a low ebb have been so long in the habit of taking their architecture philosophically, like their streets, that they hesitate to do anything more than remonstrate. Yet, these very men have taken the most determined stand when other abuses were pointed out to them. Who shall say what might not befall if they should suddenly discover how far, architecturally, Philadelphia is from holding the rank she ought to hold among the cities of America? One might almost wish that some influential critic would proclaim from the house-tops so that all the town might hear: "For years you have been surrounding yourselves with buildings of which the greater number range between the monstrous and the commonplace. Even the building you are proudest of, your very City-hall, has entrances far too narrow for the swelling streams of foot-passengers that pour continuously through. Its tower, so far as it has gone, is impressive and beautiful. Why will you degrade its honest white marble by making it support a cast-iron representation of columns and cornices? Do you know that after you have put up enough of this iron sham to reach the height of five hundred feet, and have perched on top of it eleven tons of bronze moulded to the likeness of William Penn, you will have paid more than the price of the Houses of Parliament at Westminster? Suppose you compare the available room in the two buildings." The sour-tongued critic might go on to inform those who would listen that vulgarity and ignorance were stamped on the face of many of Philadelphia's most prominent buildings, and that these would become a laughing-stock to the other cities of the Continent, and a shame to the next generation. But he has said enough. A change for the better is being brought about without him — a change every whit as important as the one begun in 1876 when Philadelphia architecture began to lose all sense of propriety and rushed into the wild extravagances it has since been guilty of. The advance in the direction of good taste is slow, but it is doubtless better so. The city's politics need a periodical shaking up. They slip back only too easily into the old grooves. May it not be that its architecture without the hope of any sudden and sweeping improvement is little by little making a steady advance; that the very slowness of its progress is a guaranty against any relapse, and that the day will come when our people shall not be afraid to ask a stranger's frank opinion of their buildings?

This improvement in style is more noticeable just now in country and suburban work than in the city proper. Mr. W. R. Emerson has been doing some admirable country houses, generous in plan, original in composition and with most beautiful detail, but, in spite of the local prejudice in its favor, with very little stonework visible except for terraces and the like. Mr. McKim, too, has done much toward raising the standard of public taste. A Philadelphian himself, he knows the fondness the people have for the solid stonework of their fathers, and although there are plenty of houses in the neighborhood where he has been lavish of shingles and weather-boards, his later work here shows a fine appreciation of the feeling for the old-fashioned country house. It is to be hoped that he does not resent imitation, for in Germantown especially so many people are struck with the beauty and fitness of one of his last houses that impressions of it — some of them tortured almost out of recognition — are springing up on every side. This house and its prototypes (many of them are still standing on the Main Street of Germantown) are an admirable source of inspiration for architects, but unluckily there is another type of house that is as offensive as this one is agreeable, and that for very different reasons has taken quite as firm a hold as the first. This is the "Seashore Cottage" type. Not the modest nestling cottage of the New England coast, as gray as the cliff it clings to, but the type which building papers of the "every-man-his own-architect" class affirm can be built for twelve hundred dollars, the type of flimsy, jig-sawed, polychromatic house that has spread from its home on the New Jersey beaches to the uttermost edge of our frontier towns. Some day, perhaps, it will disappear, but it would be rash to predict its fall during the lifetime of this generation.

One practical defect in the pattern of the early stone house mentioned above is its lack of as much porch-room as our summer climate makes desirable. It is, of course, out of the question when working in this manner to let the upper stories project, and thus take away from the temporary look that a "lean-to" porch so often has, so that architects have tried the most diverse ways of overcoming the difficulty. The colonial porch, with its columns running two stories high so that the second floor windows are protected as well as the first, is out of favor, as the extreme height of the roof makes it a poor protection when the wind is blowing on a rainy day, or when the shadows are lengthening on a clear one. But let the problem be solved as it may, by a second story covered porch, by exaggerated penteaves, or by the obvious one-story porch covered with any of the innumerable kinds of hipped roofs or pediments, it is gratifying to note the less and less frequent use of the long narrow strip of a porch where it is impossible for people to arrange themselves except in parallel lines, and the growing popularity of the square or round form, with a smaller area than the old kind, perhaps, but with the general proportions of a living-room.

The mechanic's lien law, which has been a source of annoyance in this State for more than a dozen of years, has become more than ever obnoxious since the passage of the Bill last summer intended to amend it. The Bill of 1874 provides that in case of the contractor's failure to pay, any one furnishing material to the amount of $50 may attach the building after the owner has taken possession.

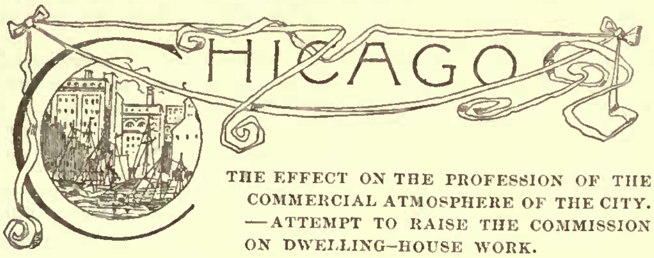
Under this provision, the material-men do not hesitate to furnish everything to a builder who may have no credit whatsoever. Building thus becomes almost the only trade in which unscrupulous men can get unlimited credit, and they have not been long in taking advantage of the law. Thus a class of irresponsible builders has sprung up against whom neither owners nor architects have any means of protecting themselves. The obligatory release of liens is no safeguard, because a dishonest contractor can get a little material from one man, pay for it, get the seller's receipt for the money and obtain elsewhere on credit an unlimited amount of the same commodity. The owner, with no means of telling from whom the material used in his house was bought, finds, after making what is certified to be his final payment, that liens have been filed against his property, and is in the condition of a man who having just paid his tailor's bill finds his suit of clothes seized by a still unpaid cloth-dealer. It has been maintained that if liens were filed, the fault was with the architect for handing the owner his release and certifying that the final payment was due the builder. In this way some of the most prominent architects in the city have been obliged to pay thousands of dollars because the contractor was insolvent. Presumably, it was in order to counteract the manifest injustice of this law that the Bill of 1887 was passed. It provides that the owner must be notified of the intention to file a lien within ten days after the material has been placed on the ground. So far so good. He is at least warned and may give the builder a good deal of wholesome anxiety by insisting upon looking over his receipts. But any relief that the Bill of June 17 affords is more than counterbalanced by the clause stating that "All building and machinery made liable to a mechanic's lien . . . shall also be liable to a mechanic's lien for any work done on said building as machinery by *any sub-contractor, mechanic or laborer*." Laws of this sort only serve to do harm to building in all its branches, and to injure more than to protect contractors of the better class. It is reassuring to see that the amended law has already been appealed from as being unconstitutional, and that a very general impression prevails among lawyers that it cannot stand.

In front of the Post-Office, where the Chestnut Street sidewalk becomes generously broad, have been standing for some time two bronze groups soon to be placed in Fairmount Park. One is M. Cain's "Lioness and Cubs," and the other Mr. Boyle's *Salon* piece, "The Stone Age." Although the lioness by her gigantic size rather dwarfs the scale of the other group, it is easy to see which of them holds the first rank in popular favor. The lioness, in an attitude that strongly recalls the proud pose of the same sculptor's superb lion in the Luxembourg Garden (of which there was such a clever sketch in the New York Architectural League's Exhibition this year) is not, like this one, standing victorious over the freshly killed game, but holds her prey aloft, out of reach of her three cubs that are crawling toward it flat upon their bellies in the most admirably cub-like manner. In fact, it is doubtful whether these cubs do not make the most truthful part of the group. Some people find the pose of the lioness herself theatrical. It is much easier to prove this charge unfounded than to deny that she is exceedingly well fed, and has an unmistakable air of the menagerie. There is, indeed, so little of the wild animal about her as almost to make one think — if the thought were not rank heresy — that M. Cain is so sure of his world-wide reputation as an animal sculptor as to be content in these latter days to work on the strength of it. This is a reproach that one certainly cannot make to Mr. Boyle. While his group composes satisfactorily, the actors in it show that same thoroughly untamed look that marks his earlier "Indian Group." His present subject is its companion piece. An Indian woman, a bear-cub just killed beside her, looks intently toward its approaching dam. The squaw's right hand grasps a stone hatchet, and her left is clasping a baby that she has just snatched from the ground, and now strains to her side with

such instinctive energy that her convulsed fingers press into its flesh. Half hiding on the ground an older child — a young savage, if there ever was one — crouches clingingly at her feet.

As between these two works of art the public — prejudiced, perhaps, by local pride — has decided that the Philadelphia sculptor has beaten the great Frenchman. Many artists have had the temerity to acknowledge that there was some reason in the popular judgment, and after all, why should it not be so? During the life of William Rush, was he not by all odds the first sculptor of the young Republic, and was it not a Philadelphian who entered the École des Beaux Arts at its last competition in the Department of Sculpture at the head of seventy odd applicants?

In connection with its regular exhibition, the Pennsylvania Academy of the Fine Arts holds its second annual exhibition of architectural drawings. The doors of the Academy were opened to the public on the sixteenth of this month, and the exhibition will continue for six weeks from that date. An extended notice of it will be given next month.



THE EFFECT ON THE PROFESSION OF THE COMMERCIAL ATMOSPHERE OF THE CITY. — ATTEMPT TO RAISE THE COMMISSION ON DWELLING-HOUSE WORK.

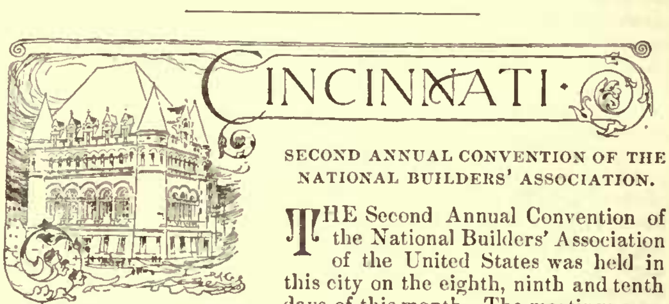
FROM Chicago there seems to be cause, as well as from the East, for the raising of the lament made by some architects, that architecture is no longer considered as a profession and that the public treat it merely as any other purely commercial business. Undoubtedly there is some truth in this, but to a very great extent if this is the feeling of the public, it is because the standard of professional etiquette is falling from what it should be, and this more by the fault of the profession itself than of the people. That it should in America partake even more of a commercial character and tone than in Europe is natural and unavoidable. Abroad we perhaps rightly have the almost universal reputation of being a nation of traders, that and nothing more. This commercial spirit crops out everywhere and with every one. Our instincts are all in that direction. We form partnerships as naturally and easily as possible, and all for the sake of expedition and increase of business, in fact, to make more money. This very circumstance of partnerships shows of itself how differently from the Italian or French the architects here look upon the profession; with Americans to a very great extent it is business. Such, then, being our nature, strengthened as it is by education and contact with those about us, it is necessary that while conforming to the age and conditions that we live in, we should at the same time keep architecture above mere commercial business, and conduct all its details with the greatest possible accuracy and despatch according to approved business methods.

Chicago has the reputation of being one of the most remarkable business centres of this age and country. On every hand are evidences of it and it requires no particular brilliancy to perceive the commercial spirit standing out everywhere. It permeates everything, and art and architecture are under its baneful influence in no small degree. The spirit has gone so far and penetrated so deep that even those exponents of the profession, the architectural journals which supposedly would stand upon the highest plane, now commence praising those methods which pervert everything to the getting of business. The following is a clipping from a recent obituary notice: "Even in his social relations he was always on the alert for business — not offensively so, but enough to characterize him as a typical Chicago man — and he secured many large commissions when to all appearances he was simply indulging himself in a little recreation." All this seems to be said with the idea of praising a most laudable characteristic and saying a very complimentary thing, but, indeed, ideas of what is praiseworthy and commendatory sadly vary!

On the above principle, every pleasure and recreation of life should be prostituted to the getting of work. No evening party, no reception, no private dinner, should be honored with an architect's presence unless there were a chance for business to come from it. Unfortunately, this is truly so much the case that some architects here have the unenviable reputation of going into society and belonging to clubs for absolutely no other purpose than business. As a natural result, others who would like to enjoy social life for itself, have the same imputation put upon them whether they will or no.

On the other hand, in such a commercial city as this, commercial methods have undoubtedly done considerable to increase the respect that the architects are held in by the public. By no other means than commercial methods can some business men be brought to respect anything, anybody, or any class of men. They can only judge of and respect those who follow in the lines that they themselves know and appreciate and admire. It can very justly be said of most of these business men that when once they have made arrangements with an architect, they make no question of delay in paying commissions; whatever trouble there may be in this direction seems to come to a greater extent from those not strictly engaged in commercial affairs. Neither will these business men as freely ask gratuitous competition: several buildings of importance for which commissions have recently been given, notably, the new armory of the First Regiment, were awarded to the architects "without competition."

Just at present the matter of professional compensation is receiving considerable thought here, and a strong movement is on foot to agitate the matter and, if possible, advance the rate on isolated dwellings from five per cent to seven. The feeling seems to be growing that the schedule of the American Institute of Architects is not in all respects entirely satisfactory. The idea now being pushed is to eventually modify the entire schedule by raising some items and lowering others. The commencement of reform, however, is to be made by the raising and not the lowering process. The movers say, and very truly, that the amount of time, worry, vexation and actual labor on an average dwelling-house is many times greater, notably in the superintendence, than on an ordinary commercial building, and yet, according to the existing schedule, the same percentage can be demanded. This certainly does not seem exactly just and equitable either for client or architect. Naturally, all architects would be pleased to see their work better paid for and their profits larger, but when it comes to signing the paper now being circulated, binding the the signers to adopt the seven per cent for a certain length of time, there is some hesitancy. There are those who fear it would have the appearance of a "trust" and scare the public. Others are perfectly ready and willing to sign any number of "whereas's" relative to the desirability of making the rate of compensation seven per cent, but as to resolving to charge nothing less, that is a somewhat different matter. So that probably the whole outcome of the matter will be that, aside from the recommendatory report already made at the last meeting of the Illinois Association, nothing of present definite importance will be accomplished. It may, however, cause members to more strictly adhere to the schedule clause relative to dwellings which cost less than five thousand dollars, and to obtain full fees for all cabinet-work. Eventually, it seems quite probable that the matter of general revision will be brought up and at least discussed in some of the conventions.



SECOND ANNUAL CONVENTION OF THE NATIONAL BUILDERS' ASSOCIATION.

THE Second Annual Convention of the National Builders' Association of the United States was held in this city on the eighth, ninth and tenth days of this month. The meetings were ably presided over by President J. Milton Blair, of Cincinnati, and Mr. W. H. Sayward, of Boston, the Secretary of the Association, filled that post to the entire satisfaction of the body.

About one hundred and twenty-five representatives were present from twenty-six different cities, all the principal cities of the country having sent representatives. Each day's session opened with prayer, and the meetings were conducted under strict parliamentary rules, and the debates upon the questions before the house were all of a character that would reflect credit upon any men assembled for any purpose. The architectural conventions might well take pattern by the late Builders' Convention and throw more "Vim, Vigor and Victory" into their conventions.

The architects of the country are hereby warned that the builders are in earnest and that all plans and specifications must hereafter be done up in a finished and complete manner and "*in ink* or by some process that will not fade or obliterate and be complete in every part." From the passage of the above resolution it is reasonable to infer that it has been the custom of some architects to make their plans in pencil, get bids on them, and then, in the process of finishing up, to alter them as their needs seem to require.

2. Drawings must be made to a scale not less than eight feet to the inch, and such portions of the work as seem to require a more thorough explanation should be made to a larger scale. In the passage of the above resolution the architects of the country are to be congratulated upon a very narrow escape they had from the labor and time and trouble it would take to put all their details, full-size and otherwise, in ink, as an amendment embracing such a thought was very nearly carried.

3. Specifications hereafter must be more specific, and all such indefinite demands as that "the contractor must furnish all work that is necessary and that may be demanded by the architect," should be eliminated from the specifications before estimates are submitted.

4. This resolution embraces what would seem to be a just demand on the part of the builders, *i. e.*, that their estimates should not cover an indefinite depth of foundation, but that they should be paid extra for all such work not distinctly shown on the drawings.

5. Our friends, the builders, in this clause take a magnanimous view of their business, and will hereafter (even if they have not heretofore done so) cover in their estimates all demands made by

the specifications, unless objections are made thereto in writing at the time the bids are submitted. They will "also take the specifications as their guide for estimating." One wonders what other means a contractor would have of making up his estimate, and this clause will, no doubt, puzzle many an architect striving to arrive at a correct understanding of his relations to the builder.

6. Everything shown on the plans must be mentioned in the specifications or it will not be put into the house.

7. Builders do not want to pick out of twenty or thirty pages of specifications what should be on perhaps one or two or more pages, and so they want the architects to classify all work and put all that pertains to each separate department by itself and grouped under appropriate headings.

8. This clause was one that caused considerable discussion and one that very nearly caused a confusion of tongues and a second Tower of Babel. In brief, the resolution as passed was about as follows: The owner is to have his house left complete and in perfect condition as far as possible; all cutting, patching, pointing-up, etc., is to be done by the mechanic having control of such department, but the cost of such cutting, pointing-up, etc., must be paid for by the mechanic who is the cause of ripping-up. One member said that on one job it cost him more to repair after the other mechanics than he got for the entire contract.

9. Contractors, when required to estimate for work involving any or all sub-contracts, should not be restricted as to whom they shall employ as sub-contractors unless previously notified.

10. The builder will hereafter charge at least ten per cent on the cost of any work and materials that may have been reserved from his contract and afterwards added thereto.

11. After estimates have been opened, the lowest bidder is entitled to the job, and the owner must deal with him for any changes that are made on the drawings (unless such changes involve a complete alteration of the plans), and if they cannot agree, then the matter is to be left to arbitration, and in no case are the two lowest to figure on any changes.

12. If the owner does not accept the lowest invited bid, but rejects all such bids, then he is to pay such lowest bidders as follows:

For work amounting to $5,000, or under, . .	$25.00
For work from $5,000 to $50,000, ...	50.00
Over $50,000, ...	100.00

13. Contracts must be awarded within a reasonable time (say ten days) after the competition is closed (or builders cannot be held to their bids), and invited bidders are to have the privilege of being present at the opening of bids.

14. When security is exacted from a contractor, a like amount of security is to be required from the owner, and where a penalty is exacted from a contractor on a time contract, a like amount is to be paid the contractor as a premium if the work is completed before the time specified.

In the passage of the first part of this resolution the builders must have forgotten that the lien laws give the builders ample security for all claims against the owner, and that the owner has no such remedy.

16, 17, 18, are resolutions governing the relations that exist or should exist between contractors and sub-contractors. A contractor, where he uses a sub-contractor's bid in securing a job, must give such sub-contractor his work unless said sub-estimate is sent to the head contractor *unsolicited*, then the head contractor need not so award the work unless it is his pleasure to do so. The owner must elect which way he intends to let his work, whether in a lump contract or in separate departments, and not solicit bids both ways.

As the foregoing resolutions were the only ones involving the relations existing between architects and builders that were passed upon, it is not necessary to further follow the actions of the convention except to say in a word that all their debates were tempered with justice to all parties involved, and not a little wit as well as wisdom crept in, perhaps unawares to the speakers.

The papers read were of a high character and showed great research, but each one seemed to deal more in generalities and history than in plain common facts, and while it may be a very fine thing to say that bricks are the oldest building material known to man, and that roofs always have formed an essential element in the make-up of the house, and so on, yet those that listened would have been better edified if the papers had been more technical and had less of the college oration about them. This association cannot, however, but result in good to the building fraternity, and each recurring convention will add new lustre and knowledge to be drawn upon at demand by all who desire progress.

As to the social part of the coming together of these men, they certainly enjoyed themselves, if their testimony is to be taken on the subject. What with receptions, carriage drives, personal attention, etc., it would seem that the social part was well looked after by the local committee, and the whole wound up with a banquet at the Gibson House, given by the Builders' Exchange of Cincinnati, which was as fine an affair as was ever given in this city upon any occasion.

The following officers were elected for the ensuing year:

President, John S. Stevens, Philadelphia.
First Vice-President, E. E. Scribner, St. Paul.
Second Vice-President, John J. Tucker, New York.
Secretary, W. H. Sayward, Boston.
Treasurer, Gus Topper, Chicago.

Board of Directors, David M. Alexander, Albany, N. Y.; E. L. Bartlett, Baltimore, Md.; Ben. D. Whitcomb, Boston, Mass.; J. H. Tilden, Buffalo, N. Y.; Henry Oliver, Charleston, S. C.; Geo. C. Prussing, Chicago, Ill.; H. E. Holtzinger, Cincinnati, O.; A. McAllister, Cleveland, O.; Thos. E. Knauss, Columbus, O.; Alex. Chappoton, Detroit, Mich.; John Rowson, Grand Rapids, Mich.; W. P. Jungclaus, Indianapolis, Ind.; Richard Smith, Milwaukee, Wis.; H. N. Leighton, Minneapolis, Minn.; I. N. Phillips, Nashville, Tenn.; F. H. West, New Orleans, La.; Marc Eidlitz, New York, N. Y.; Wm. Harkness, Philadelphia, Pa.; Samuel Frances, Pittsburgh, Pa.; John W. Briggs, Providence, R. I.; Chas. W. Voshall, Rochester, N. Y.; E. F. Osborne, St. Paul, Minn.; E. F. Beck, Sioux City, Iowa; C. A. Meeker, Troy, N. Y.; E. B. Crane, Worcester, Mass.; D. J. Macarty, Washington, D. C.; Geo. T. Elliott, East Saginaw, Mich.; Wm. Taylor, Kansas City, Mo.; Wm. Dickinson, Syracuse, N. Y.; Thos. Armstrong, Louisville, Ky.

A medal to cost $100 was voted to the retiring President, J. Milton Blair, of Cincinnati. CARY.

NEW·YORK

SOME DIFFICULTIES ATTENDING THE DESIGNING OF THE PROPOSED EPISCOPAL CATHEDRAL.

THE scheme for a great Episcopal Cathedral has been again agitating the public mind in New York, at least in so far as the daily newspapers can be said to be that most important factor in all such undertakings.

It is generally understood that the site is secured, although a rumor has it that there is a mortgage on the property, which mortgage is assumed by the new owners. To an outsider this would not seem a desirable state of affairs, but then an outsider's opinion must necessarily be of small consequence, since he is not in a position to judge intelligently of the conditions which may have made such a proceeding advantageous. It would seem to tend somewhat to chill the enthusiasm with which this noble scheme was greeted, since in a measure it conflicts with one of the best intentions of the originators — that of going on only so far as the funds would permit and leaving the completion to the next generation. However, it is hardly fair to criticise the actions of such a body of distinguished men on the basis of a mere rumor, which in all likelihood is far from the truth.

As to the scheme itself, so much has been written about it and it has been so ably and intelligently discussed, that it would seem on paper a comparatively easy affair to carry it through successfully. In some respects it is. The science of engineering has reached a high state of perfection now-a-days, and notwithstanding the lamentable failure of the best known and most important stone vault yet built in this country, the one at Albany, we have men fully competent to build so vastly larger a structure as the new cathedral would inevitably be. As to painters and sculptors, it may be reasonably doubted whether they could — that is, in sufficient numbers — rise to the necessary high level of work, although this seems like an heretical opinion in view of the popular jubilation over our modern artistic triumphs. This is said without any wish to reflect upon the merits of our artists, many of whom can no doubt be mentioned, all of great ability and long training in their art, and whose reputations ought to assure us that their work would bear fitting testimony to succeeding generations of the best artistic thought of to-day. But while it is true, it cannot be accepted as explicit reassurance that their combined work will give the unity of effect in the result that above all else should be attained. To be sure, Mr. A. is our most important figure-painter and Mr. B. is the best known decorator, but these two men may never have worked *together* on a large affair and neither of them has ever yet been obliged to grapple with the problem of making his work effective at a distance of say five hundred feet, and in an interior, with the difficulties of cross-lights added to that of mere distance. And yet this is even a less difficulty than that which confronts them when they are obliged to make their combined efforts on the vaults harmonize with the work Mr. C. is to do on the walls; Mr. C., let us say, whose paintings of Eastern interiors have long shown his great ability. The accurate and charming style of drawing of all Mr. A.'s figure-work will not improbably lose some of its effect when swallowed up in the immensity of the space, while Mr. B., the decorator, will have a general scheme of color for his vaults that may prove to be in irrepressible conflict with Mr. C.'s plan of treatment for the walls.

Not but what all three of these distinguished men will work together in perfect friendliness and dine together once a week, but it is well known that Mr. A. studied in England, while Mr. B. has long lived in Paris, and Mr. C., being the long-suffering "rich amateur" of architectural students, has roamed about the world, studying first in Munich, and then in Rome, and just before returning home, has made long journeys in the East, gathering bric-à-brac and impressions of color with equal ardor and success. The work of

these men, each of strong individuality, and each still farther separated from the other by different training, cannot be reasonably supposed, when placed in absolute juxtaposition, to give such a resultant harmony and unity as would ensue had they been long accustomed to work together with the grand general effect always in view, each adding his part to the central harmony rather than solicitous as to the particular effect of his isolated picture.

It would never do to say that the variety thus obtained would be all-sufficient, since this variety will come of itself as the work proceeds, whereas the more important quality of unity will have to be continually in view, otherwise it will not be attained. If unity be not obtained, the new Cathedral will not have the characteristics of a monument but of a picture-gallery.

To be sure the picture-gallery and museum are peculiarly modern, and, perhaps, this side of our life is one that should find its expression in this great effort, but it could not give future generations a very high notion of our grasp of the central truths of art — that is to say of the general harmony of all the arts. Rather would they say that we collected excellent pictures and charming statues, but that at heart we remained barbarians with a mere varnish of artistic appreciation, since we did not know how to use them when they were done, so we hung up the paintings in almost any place and stuck statues about, and then rested from our labors in serene unconsciousness of more general laws underlying and uniting individual excellencees.

In the Renaissance when a great lord built himself a new palace, he did not send about to the art-galleries to pick up examples of the old masters and have them hung on the walls. Far from it; he invited some artist to come and paint his walls — not to paint pictures for his palace in the modern way; for there is a vast difference between the two. The first presupposes art to be a necessity; the last presupposes it to be merely a luxury. That in either case the painting would be on canvas and placed against the wall, is no refutation of the distinction. One means enriching and beautifying a wall, the picture forming part of the design, while the other is merely hanging a picture against a wall, and, for this, one picture will do about as well as another.

Now, our painters in the vast majority of cases are accustomed to paint pictures merely — the frame isolates it from everything else, and the artistic care does not really extend very much beyond the frame.

This is the result of a purely modern condition of things, but it is by no means the condition that will train men to work toward unity in a tremendous monument. It is not so much the fault of the artists as of the conditions of life that demand this false conception of art.

It cannot be too strongly insisted that to fittingly build this great cathedral, means that it must be essentially a monument, and for a monument unity is the one most absolutely vital quality. Unless throughout there reigns such subordination of parts as is necessary to the tremendous singleness of purpose, the work will miss the highest qualities and effect which should be had in such a structure.

The necessity for this coöperation of the arts has not yet come to form part of the habitual practice of the majority of the people of to-day.

It has not in past times necessitated the work entirely of famous artists to ensure harmonious results up to a certain point; but we have to-day a vast gap between the work of our best men and that of inferior talent, and it cannot be possible to have *only* the work of our most distinguished artists on this great cathedral.

The men in charge must have their efforts supplemented by those of others less considerable, and the great artistic difficulty is just here, that at the present time, owing to the isolating tendencies of training and popular requirements, we have no united school or style that would make every one feel sure that the Cathedral can actually be made as great an artistic triumph as we could desire.

The relation of the architect to this proposed popular monument is naturally the most important of any. He must be the head and centre of the work; upon his shoulders must rest the burden of direction, and he more than any other will have to give style to the whole. Not that the selection of any one, in particular, of the various manners of art, otherwise known as styles of architecture will determine the success of the work or its ineffectiveness. The matter rests on larger and deeper considerations altogether. The architect may not feel his labors done when the beautifully prepared and attractive drawings are executed with the greatest exactness, unless his work be given life and interest, and be supplemented and reinforced by the arts of painters and sculptors. Stained-glass, mosaics, gilding, all the arts must be brought into their proper places and duly subordinated to the unity of the whole.

The architect must necessarily be a very able man to do all this. It is very easy for any one to arrange that all eminent artists shall each do something on the work. It is more than difficult to so order the structure and their work in it, that all these shall combine into an harmonious whole. Judging from popular estimation, the only man who was most capable of this effort has passed away, and it may be fairly doubted whether any one else could be named, who, by his training, work and habit of mind, would seem necessarily the one man of all others for the work.

This condition of things makes one feel more keenly the need of greater unity of purpose among the various branches of art, and of greater perception of the fact that they are all branches whose highest and best effects are attained when properly employed in unison on just such a building as the proposed new Episcopal Cathedral, but which, separately, are shorn of half their dignity. It is when this coöperation is most complete that the artistic life of nations has reached its culminating point — it has always been the undue preponderance of any one that has opened the way toward decadence. L.

THE ILLUSTRATIONS

[*Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.*]

ENTRANCE TO DRILL–SHED, QUEBEC, CANADA. MESSRS. J. B. DEROME AND E. E. TACHÉ, ARCHITECTS, QUEBEC, CANADA.

[Helio-chrome, issued only with Imperial Edition.]

A GENERAL view of this building was published in issue for December 24, 1887.

GOTHIC SPIRES AND TOWERS, 4, 5, 6. — ST. MARY, THE VIRGIN, OXFORD; ST. LAWRENCE, EVESHAM; ST. NICHOLAS, ISLIP; ST. MARY, KINGSTON; THE CATHEDRAL, GLOUCESTER.

[Issued only with the Imperial Edition.]

ANDREW PRESBYTERIAN CHURCH, MINNEAPOLIS, MINN. MR. WARREN H. HAYES, ARCHITECT, MINNEAPOLIS, MINN.

THIS church is to be erected at the corner of Fourth Street and Eighth Avenue, s e, this season, in brown sandstone walls, rock-faced, and with slate and red-tiled roofs. Cost to be, $50,000; capacity, 600 sittings in auditorium. This building is to be located only one block from the First Congregationalist Church, recently completed and opened for service on January 29th, 1888.

FIRST CONGREGATIONAL CHURCH, APPLETON, WIS. MR. WARREN H. HAYES, ARCHITECT, MINNEAPOLIS, MINN.

THIS church is to be erected at once in red sand-moulded bricks and brownstone from Lake Superior; roofs of slate and red tiles, with copper finials, etc.; inside finish in antique oak; capacity, 600 without gallery; cost, $35,000.

COMPETITIVE DESIGN FOR MUSEUM OF ART, DETROIT, MICH. MR. J. WALTER STEVENS, ARCHITECT, ST. PAUL, MINN.

HOUSE FOR D. W. BISHOP, ESQ., LENOX, MASS. MR. H. NEILL WILSON, ARCHITECT, PITTSFIELD, MASS.

HOUSE FOR MESSRS. E. M. AND W. BLIVEN, YONKERS, N. Y. MR. F. F. WARD, ARCHITECT, NEW YORK, N. Y.

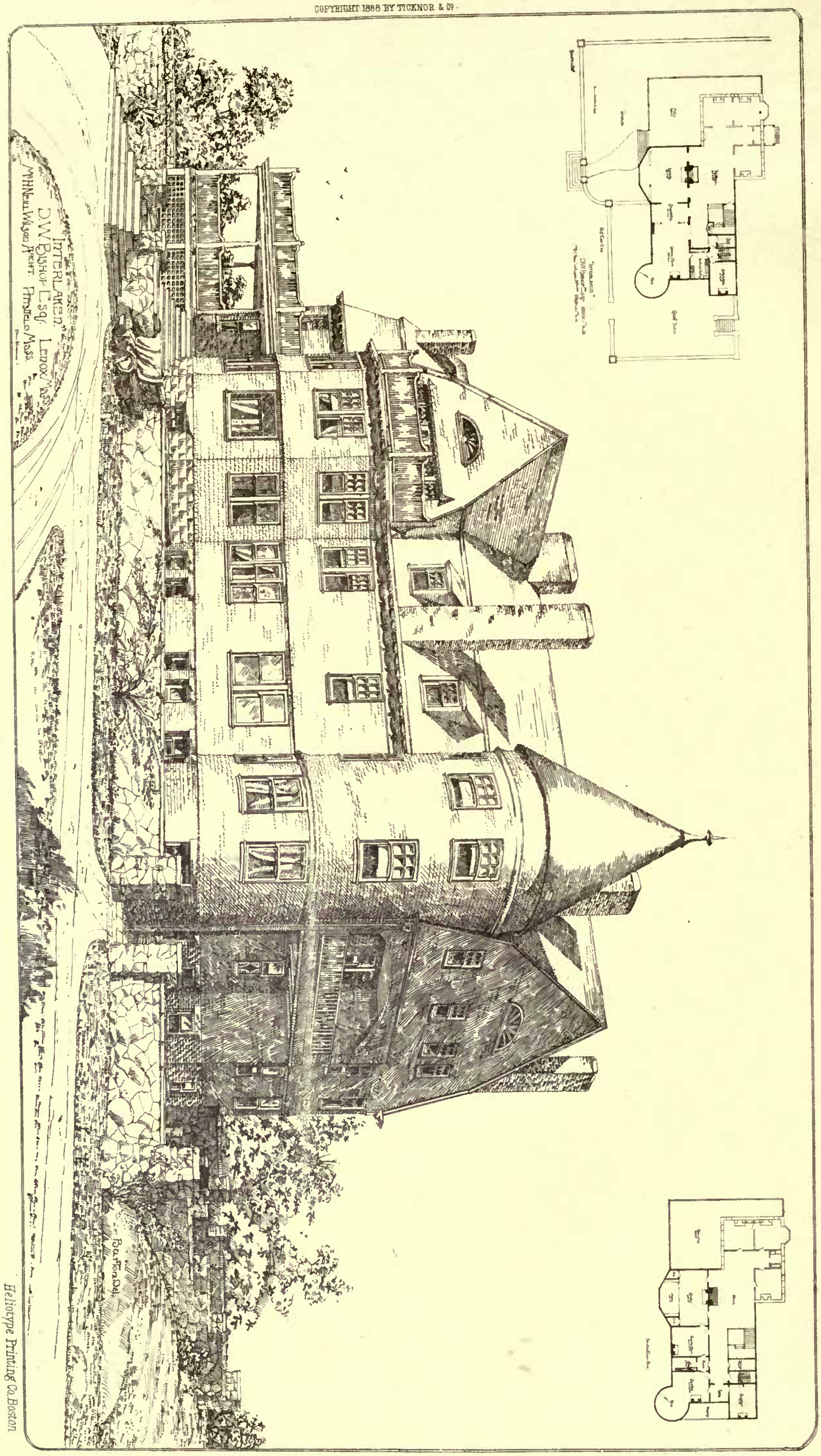
THE SENTER HOUSE, CENTRE HARBOR, N. H. MR. F. W. STICKNEY, ARCHITECT, LOWELL, MASS.

A CENTURY OF BRITISH ART AT THE GROSVENOR GALLERY, LONDON.

NOT only is this exhibition a feast of art, but it is the best which has been held at the Grosvenor for some years, in spite of the difficulties caused by the split between the proprietor and his assistants. Sir Coutts Lindsay may be congratulated upon his success in bringing together so interesting a collection and proving once more that the gentlemen who magnanimously uphold the "dignity of art" are no more indispensable than eminent cabinet ministers, statesmen and imperial rulers.

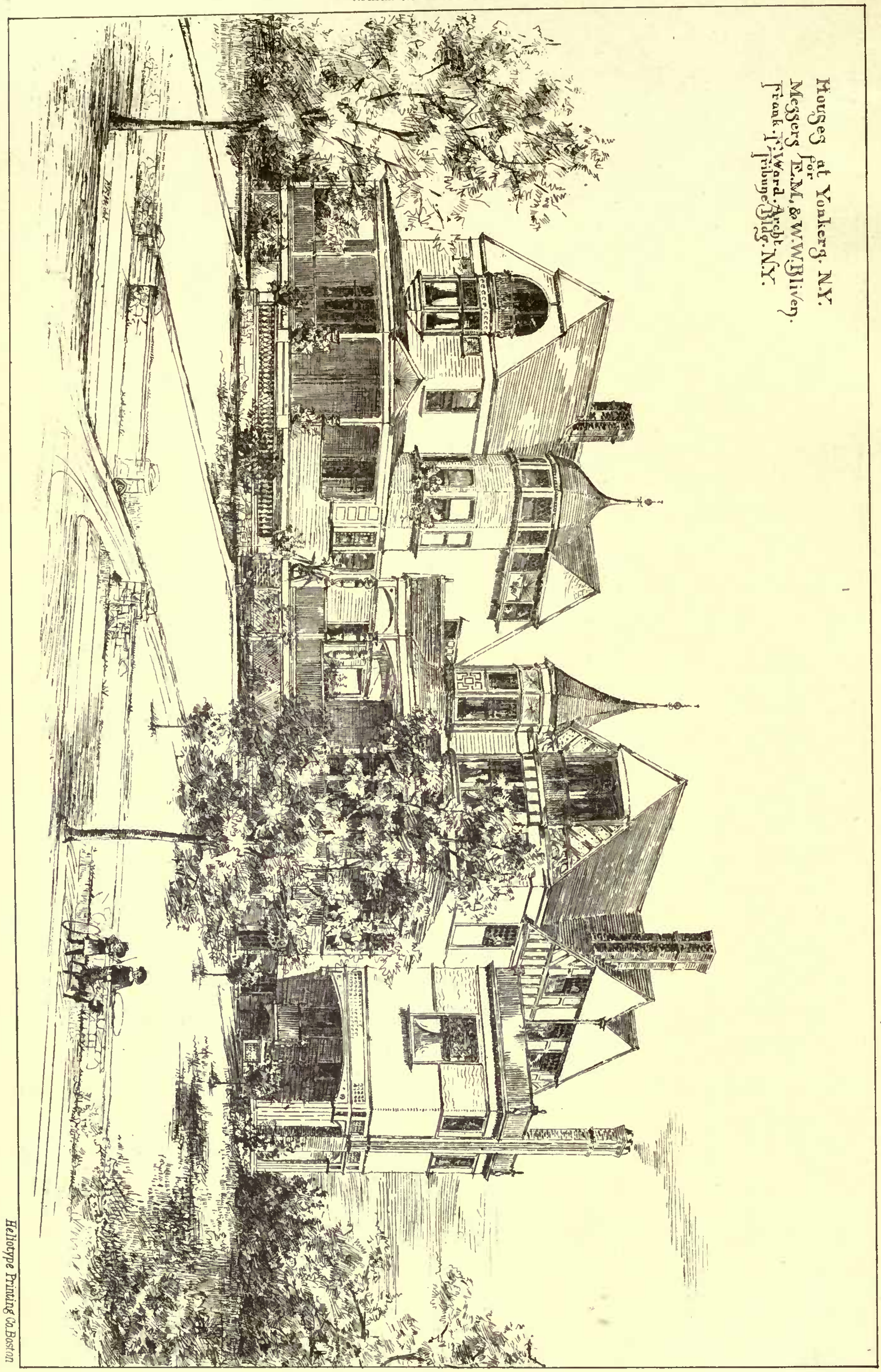
The Constables are simply magnificent, although perhaps none of them actually equal the "Hay Wain" (now in the National Gallery), which was the picture exhibited in the *Salon* or rather the Louvre in 1825, and which not only brought the painter into notice in Paris, but opened the eyes of his compatriots to his merits. The influence of Constable upon the French painters was enormous; it was he who first taught them to see Nature as she is, and that the earlier school of *paysagistes* of our own time, such as Decamps, Diaz and Rousseau owe their style to the Englishman is proved by a comparison between a little picture of Constable's in this exhibition, "Gravel Pits," and a tiny Diaz, "Les Pyrénées," in the Luxembourg gallery; they might have been painted by the same hand. It is not easy in a short article to specify any particular work when a master is represented by

COPYRIGHT 1888 BY TICKNOR & Co.



Heliotype Printing Co. Boston

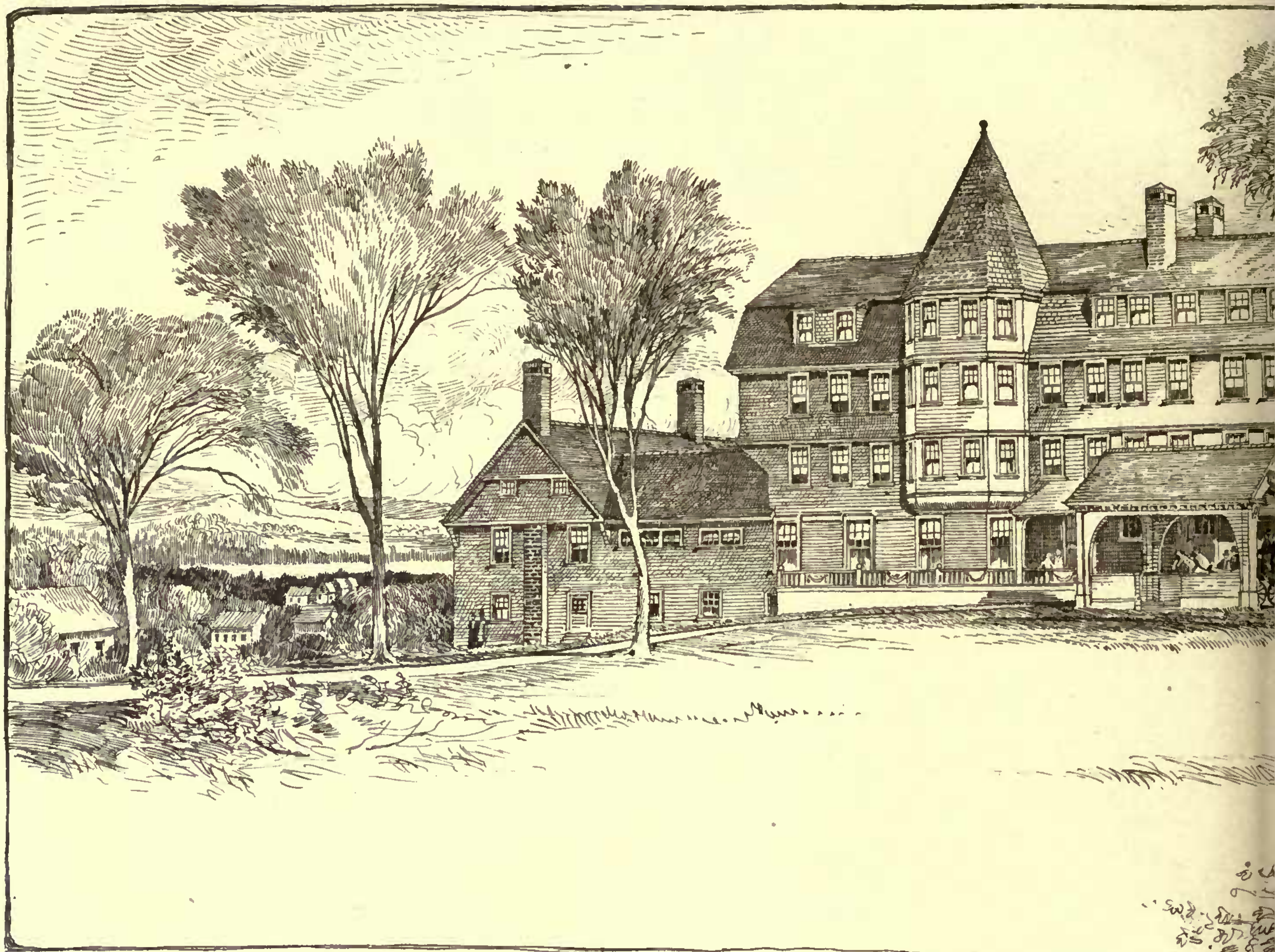
COPYRIGHT 1888 BY TICKNOR & Co

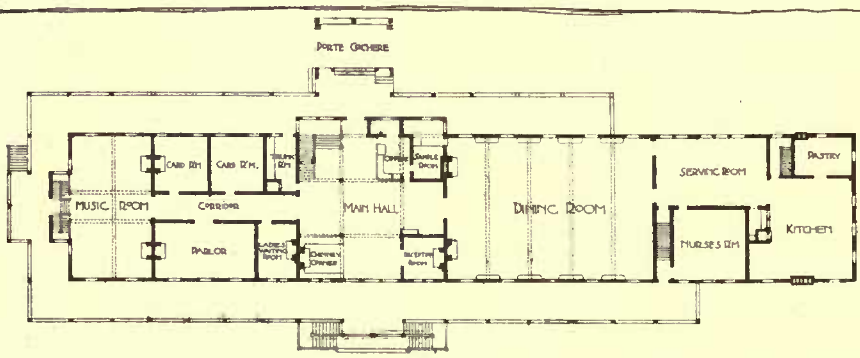


Houses at Yonkers, N.Y. for Messrs E.M. & W.W. Bliven. Frank T. Ward, Archt. Tribune Bldg. N.Y.

Heliotype Printing Co. Boston

COPYRIGHT 1

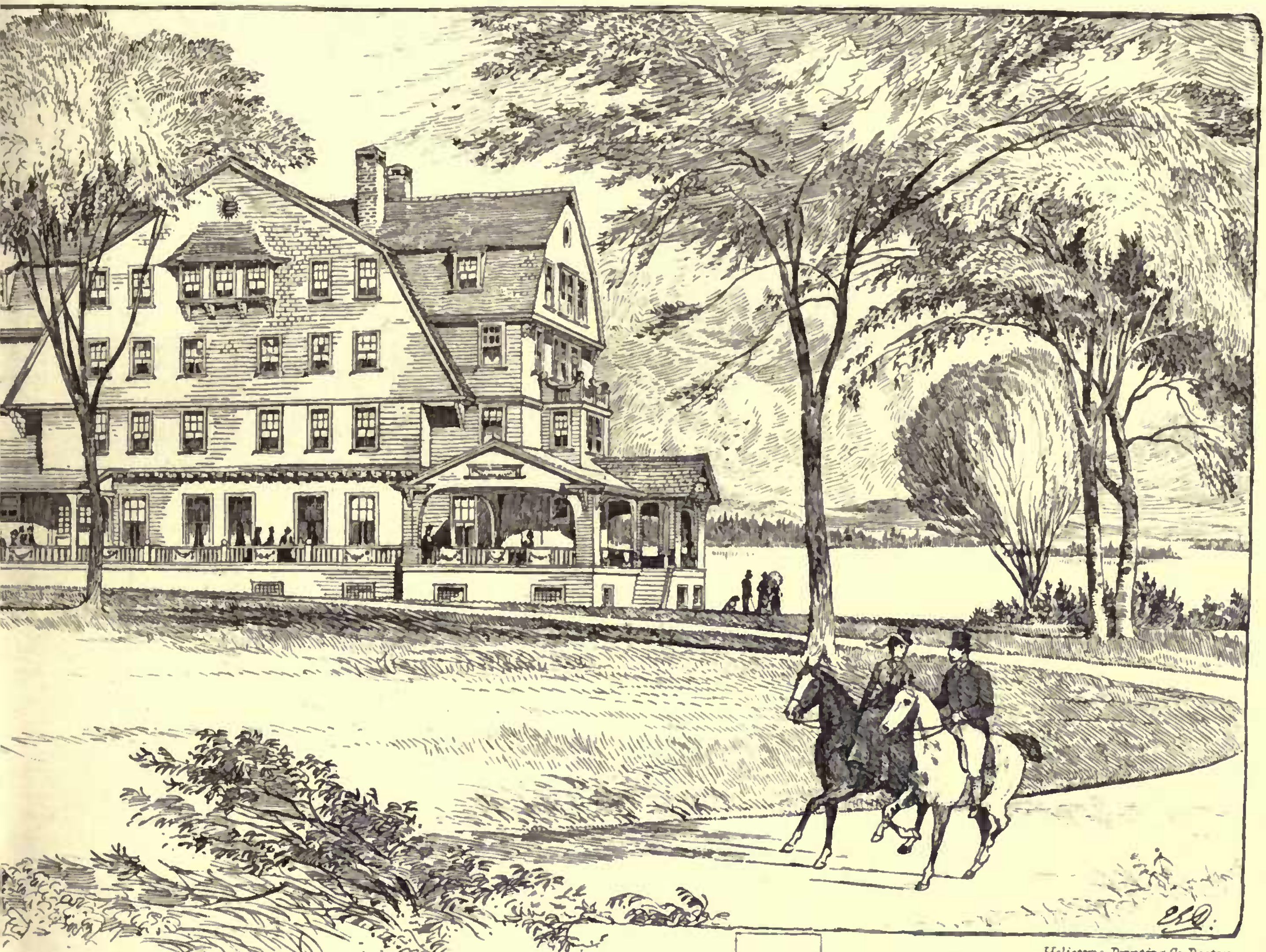




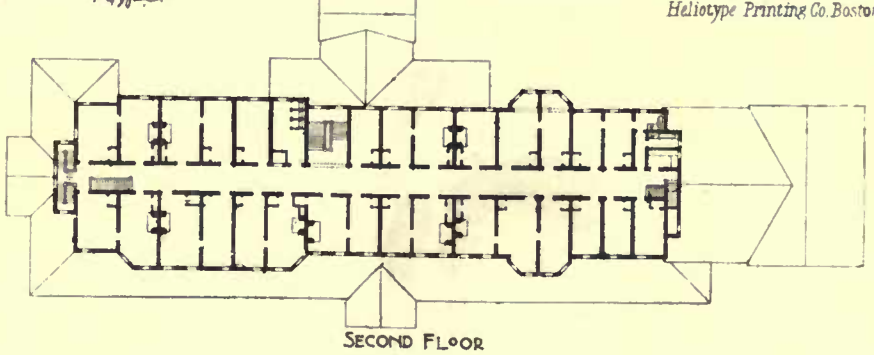
FIRST FLOOR

The Senter Hous

F. W. Stickney . Archt .



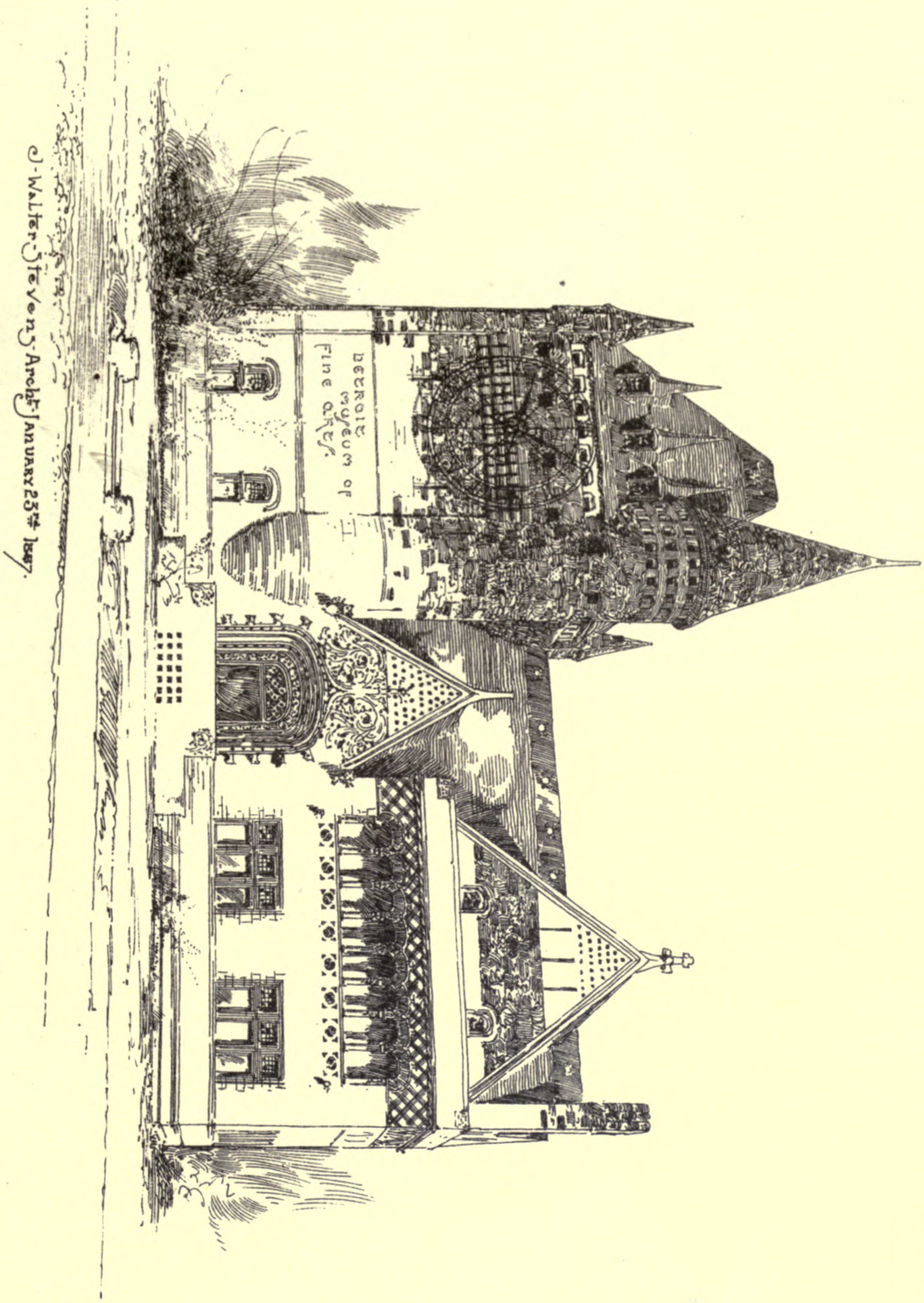
Heliotype Printing Co. Boston



Centre. Harbor. N.H.

ell. Mass.

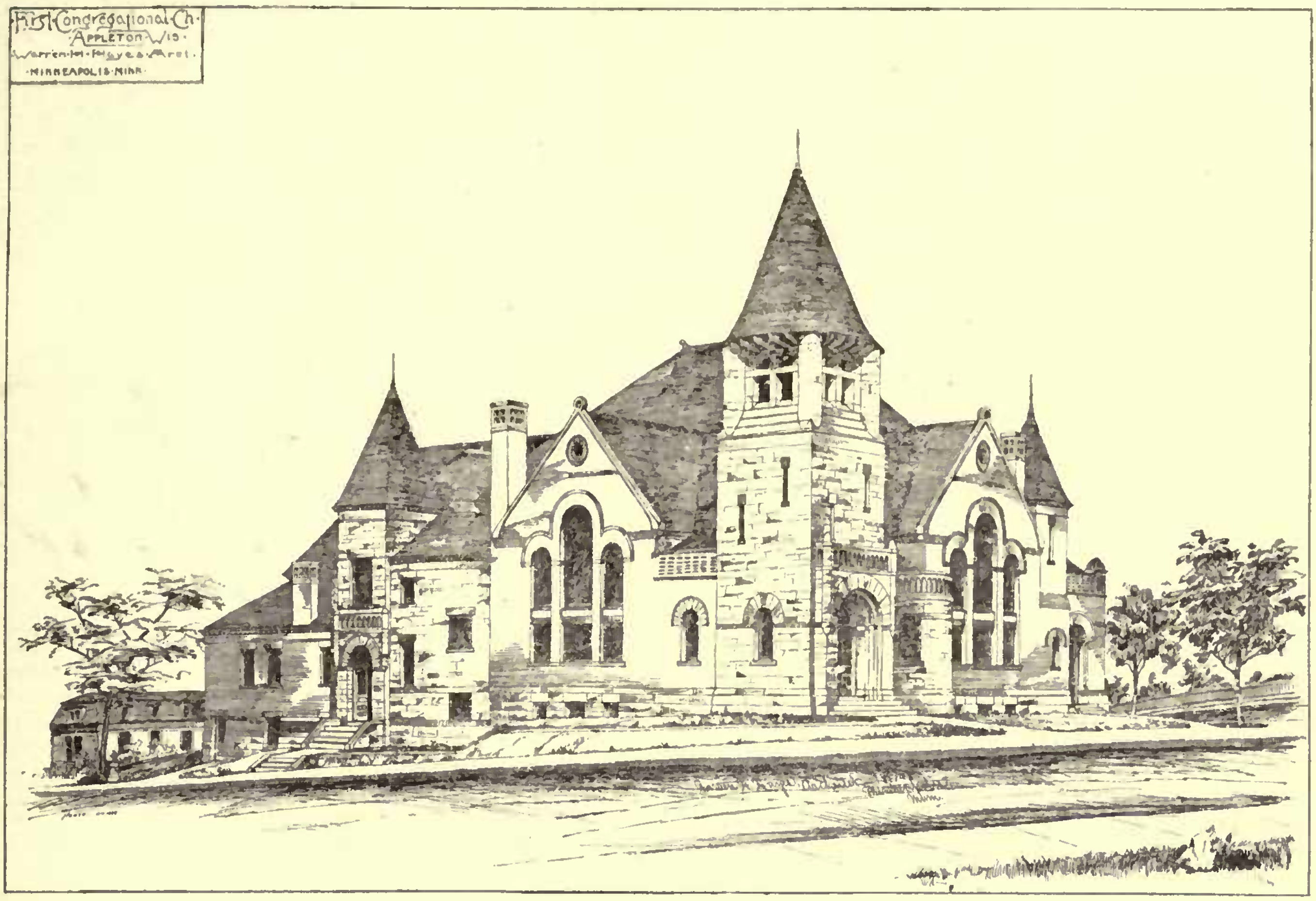
COPYRIGHT 1888 BY TICKNOR & Co

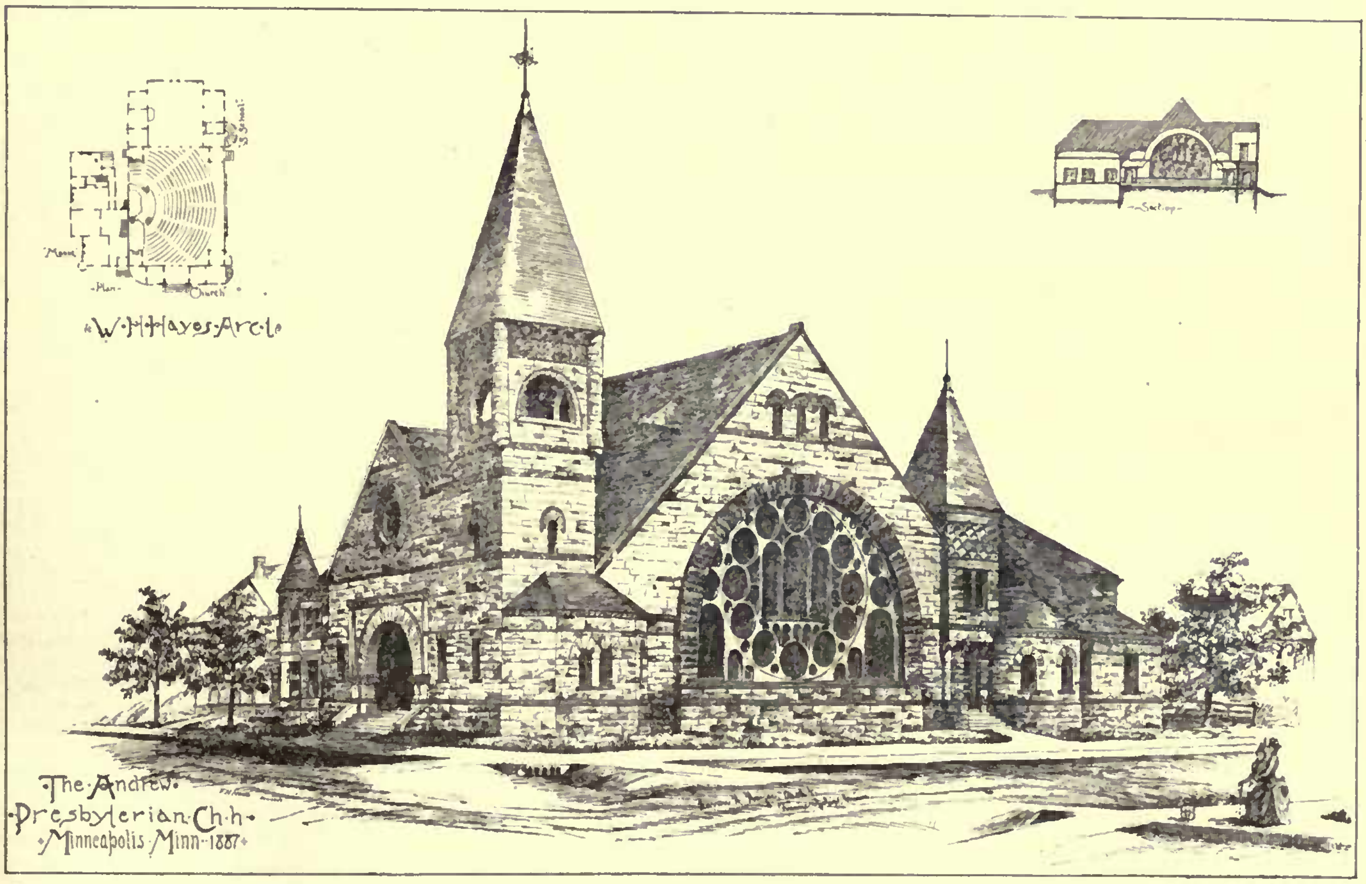


DESIGN·FOR·DETROIT·MUSEUM·OF·FINE·ARTS·BY·"L'AVENIER".

Heliotype Printing Co. Boston.

COPYRIGHT 1888 BY TICKNOR & CO





Heliotype Printing Co. Boston.

thirty-three pictures, all more or less noteworthy, but the "Salisbury," "Denham Vale," "Arundell Castle and Mill" (his last work), and "Dedham Mill" are particularly fine in luminosity. The skies are exquisitely clear and light and the "Arundel" is specially remarkable for that flickering sunlight, which seems to sparkle all over the picture.

Bonington is a painter one has rarely seen except here and there in Paris, but he, too, had the art of filling his skies with light and air. His "Château of the Duchesse de Berri" is exquisite; so, too, are the "Shores of Normandy" and "Ships at a Pier," which somewhat reminds one of the modern Frenchman, Montenard.

Gainsborough is poorly represented; his portraits are weak and affected or black, some of them even inferior to the worst in the collection shown in the same galleries two or three years ago, while one or two are almost caricatures. Nor is Sir Joshua Reynolds well represented. But, on the contrary, Romney comes out better than usual—partly because there is only one "Lady Hamilton" and that a bad one. We are most of us weary of that mass of beauty, ignorance and shamelessness, although I presume some people still take an interest in her, or Mr. Fitzgerald would not have taken the trouble to use his whitewashing brush in her behalf. But to be able to admire a Romney which is full of a beauty not that of Lady Hamilton is refreshing, and this we may do in the portrait of the Countess of Mansfield, a pensive lady under a tree, bathed in a beautiful light of pale gray and lemon-colored tones. "Mrs. Carwardine and Child" is another charming portrait — a mother nursing a little round-faced baby, who nestles in her arms. The whole picture is beautifully painted, even the hands are well modelled, which is very unusual with Romney.

Hogarth is represented by twenty-five works, of which several are portraits. There is the Queen's "Garrick and his Wife," two or three "Peg Woflingtons," one or two "Conversation Pieces," and one or two landscapes, as well as some portraits, but, on the whole, I must confess that I was disappointed. Some of them show Hogarth's sharp crispness of touch, his exquisite flesh painting, his careful finish of accessories, and his talent for happy composition. But, having seen all these, my feeling is, that if I want to study the painter, I can do so better at the National Gallery, where there is less, but that little — "The Marriage à la Mode" — is of better quality. There is an exaggeration about some of the works at the Grosvenor and a want of life in some of the figures, and even at his best Hogarth makes one sad. A painter *des mœurs* is useful to his generation and perhaps also to posterity and so we may be thankful that Hogarth devoted himself to the *actualités* of his day, but we cannot but lament that society was what it was, and it is not pleasant to dwell upon. No doubt such pictures do good at the time, and, acting as lay sermons, influence a class of people who would not listen to clerical discourses. But when once the fashion has changed, and the "point" is lost, one cannot but wish that the merit of the work was not marred by the subject. The "View in St. James's Park" is curious, as showing that the present black condition of Westminster Abbey Church is subsequent to Hogarth's time.

Morland's work is very different, being always of rural subjects. One or two white horses in this collection are exquisite and one only wishes that he had never spoiled his pictures by introducing the human animal into the company of his pigs and sheep and horses — the latter are so superior both in morals and technique!

By Wilkie, the best is one of his *chefs-d'œuvre*, the "Letter of Introduction," a picture which may rival any by Terburg or Metzu in refinement of color and silvery grayness of tone. Mulready's "Widow" may be coupled with it, although I do not agree with the compiler of the catalogue that it is superior. Nor can I endorse his words that the "'Widow' is a complete Pre-Raphaelite picture, painted before even the most stringent Pre-Raphaelite Brother began to think out his principles, and it amply justifies Mulready's saying, that he 'long ago painted in that way,' *i. e.*, long before 1848–49, the natal date of the Brotherhood." If by Pre-Raphaelitism is understood a care for detail and a faithful rendering of Nature, these two pictures may be of that school, but so must be the old Dutchmen's work, and although those were the aims and the intentions of the Pre-Raphaelite Brotherhood, they failed to carry them out. Wilkie, Mulready, Terburg and De Hooghe made the accessories of their pictures subordinate (as they should be) to the figures, whereas the Pre-Raphaelite Brotherhood swamped the figures by the surroundings. One need only to think of Millais's "Carpenter's Shop" or his "Ophelia," or any of Holman Hunt's pictures, and compare them with Wilkie's or Mulready's to comprehend this. In the "Letter of Introduction" is a wonderful Oriental vase, which, although made out in every detail, keeps its place and does not "swear" with the figures. Can the same be said for the "Carpenter's Shop's" tools or shavings, or the *et ceteras* in the "Finding in the Temple"? That Wilkie and Mulready had much in common with Terburg and Metzu is true, but whatever charm there is in the early Pre-Raphaelite Brotherhood pictures, it is not gained by truth of the different "values" in their relation to one another, which is before all things the merit of the works of their older brethren. Even the "Huguenot," charming as it is in sentiment and color, fails in this, that the leaves, the wall and surroundings assert themselves too much. A lizard may be on a wall, or a fly on a woman's *coif*, but if the fly attracts the eye of the spectator from the woman's face, or the lizard from the mass of wall, the relative values are false however true to Nature the painting of the lizard or the fly may be. Mr. H. Hunt paints the reflection of window panes upon his eye-balls, and no doubt if we look hard enough we may see it, but the light on the pupils of the eyes is not the first thing which attracts our attention when we look in a friend's face, nor ought it to be in his portrait. The difference might be summed up thus: The Pre-Raphaelite Brotherhood aimed at the individual truth of particles, the Dutchmen, Wilkie and Mulready, at collective truth of the whole; in the former the pursuit of truth led to falsehood, in the latter to absolute truth.

Mrs. Grundy might point to the Ettys as examples of the immorality of the nude. Exquisite in color and perfect in modelling, Etty's pictures are always unpleasant, and the reason is not far to seek. Like all his contemporaries, including Ingres and Gérard, his idea of the nude was simply the undressed. His Venuses have their hair bound up at the top of their heads with large combs, and his Cupids have crops of curls all round, after the fashion of the children of his day. Etty, in fact, merely painted what he saw in Nature, whereas his predecessors and the great men of the present day who follow this branch of art, idealize her. I could not help wondering when I looked at "Robinson Crusoe" whether Courbet ever saw the picture before he painted his wave in the Luxembourg; there is a wonderful resemblance in form, color and movement. So, too, it reminds me of Delacroix.

In one of the rooms, as *pendants*, are two portraits of painters, painted by themselves — Turner and Wilkie — and, although the latter is the finer work, that of Turner shows that if he had chosen, he could have devoted himself to portraiture with success. It is almost impossible here to specify any of the great master's works they are all so fine, from the furious tumultuous sea in the "Minotaur," to the sweet calm and softened sunny glow of "Calder Bridge" and "Somer Hill."

The gallery contains some good examples of Wilson, refined and placid if somewhat over conventional. The first picture which introduced Opie to fame is proof that he deserved it. The painting of the old woman in the "Schoolmistress" is equal to Bonnat or Deschamps. A little portrait by Corway ought to be mentioned as being full of charm and showing the painter's work in an unusual medium. Numberless miniatures by him are to be seen, but oil-paintings are rare, which is a pity, as his handling of this portrait of a demure little damsel is quite equal to his water-color work, if not superior. Linnell is represented by two pictures, not his best, but I cannot help thinking that posterity will reverse his present high reputation; his works are terribly crude and glaring in color, and his touch is so constantly woolly. Where is the air and the crispness of brushwork which we see in Constable's pictures?

Amongst other names in the catalogue are the Barkers, Blake, Calcott, Collins, Copley, Cotman, the two Cromes, De Wint (only oil paintings), Copley Fielding (oil pictures), W. Hunt, Landseer, Lawrence, Nollekins, Raeburn, Reinagle, Smirke, Stubbs, Varley, Vincent, James Ward, Wheatley, Withington and Zoffany (two caricatures). The Royal Academy Exhibition deserves some notice also, as it has struck out in a new line by showing a choice collection of Italian bas-reliefs and bronzes, but want of space compels me to postpone doing so until a future occasion. S. BEALE.

WEAKNESS IN DESIGN OF LOWER STORIES. — UNFORTUNATE CHANGES IN THE HOTEL BOYLSTON — PARTICULARS IN WHICH THE COURT-HOUSE DESIGN MAY BE IMPROVED. — COPPER BAY-WINDOWS.

WE have noticed on several occasions, that many of our more important buildings are at their best when seen rising over other buildings — for instance, the best point of view of the New Old South tower is from Newbury Street, between Dartmouth and Exeter, where the base is hidden; and before the new high buildings on Boylston Street were built, the Providence Depot, seen from the Public Garden, stretched a long quiet line of roof above the masses of the Boylston Street houses.

The reason that these distant views are the best is not hard to find, it is because the first stories of the buildings themselves are hidden and these first stories are usually bad — bad in two ways; they have not sufficient wall-space and apparent strength for the stories above, and they have no horizontal continuous base-course from which the façade is to rise and upon which it is to rest. Every one knows the *raison-d'être* of string-courses, of mouldings and of cornices, *i. e.*, to accent the separation of one thing from another — story from story; base from wall; wall from frieze; building from sky. The more difference there is between the things separated, the more important become the separating courses. Is there not a good reason, then, for having lines separating the building from the earth on which it rests. There is no ancient temple without its stylobate, no Florentine, Roman, Bolognese palace without its great projecting base-course, no English manor without its terraces.

Yet, we seem to have forgotten that such an idea existed, and our buildings—seemingly driven into the ground like pegs — are seen best when the first story is hidden. It is pitiable. There seems to be some utilitarian excuse for the lack of wall-surfaces in first stories of business buildings, as there is a demand, which seems at times a little excessive, for show-windows and for as much light as possible, but surely there is some better solution of this problem of getting small piers with wide spaces between them than any we have yet attempted.

The iron piers, used in such numbers in our business districts, are direct descendants of the sawed and chamfered piazza posts of the country carpenter. A high wall-surface supported on an arcade, or upon a colonnade with lintels is no new thing. It was common in both Rome and Pompeii — the Basilica Julia (Cuninas Restoration), the Pompeian Forum, the Cloisters of S. Giovanni Laterano and of S. Paolo *fuori la mura*. In Gothic work there are numberless examples, the Cloisters at Viterbo, at Caen, at Mont St. Michel, at Barcelona and San Juan de los Reyes at Toledo. Bologna, Milan, Turin, Paris, have whole streets treated in this way. Any one of these examples would suggest a façade of which the first story is nothing but columns or slight piers and spaces (these spaces glazed) but the columns should be the same color as the walls above, and, if possible, of the same material.

This applies very strongly to the block on the site of old Boylston Market. It is (above the first story) so quiet and simple, of such comparatively good proportions that the uneasiness and change of idea in the first story shows only another example of our inability to as yet successfully master the problem of shop-fronts.

This building, by the way, has two long unbroken façades, which is a great gain over the chopped-up fronts near it — and its general character is a marked improvement over the children's building-block architecture of the work a little farther up the street.

We wish we could say as much of the additions to the Hotel Boylston. Hotel Boylston belonged to a type of work which proclaimed itself as a union of Victorian and Venetian Gothic. In point of fact it but slightly resembled either. Its distinctive characteristics were pointed arches, corbelled cornices and, especially, particolored voussoirs. In white and gray marbles, as in the building at the corner of Summer and Chauncey Streets, it was too pronounced in its contrasts, but in the Hotel Boylston, where the two shades were more alike in tone, it was at its best. There was, however, always a lack of good detail. The buildings of this type were vigorous, interesting, heavy and crude to barbarism, yet they were much better than others of their time and Hotel Boylston was one of the best of the type.

Its situation is an excellent one and it is a positive evil to have a building in such a situation made worse instead of better. Recently two stories have been added; the old corbelled cornice has been left except where it was cut by the gables, where there are now abrupt meaningless gaps in its continuity. The two stories, which by their proportions, are neither frieze, mansard nor wall-surface, are terminated (we cannot say crowned) by a feeble cornice. Add to this that copper bays of a character utterly out of keeping with the building jut out in these two stories, and the result is a spectacle of architectural treatment that has few parallels in the city. Compare this with the Mason & Hamlin Company's building on Tremont Street, where the delicate proportions of the arches, the refinement of lines and mouldings, the simplicity of treatment and material, really recall the best in Venetian work, and the difference is very marked.

We spoke last month of the "commonplace detail" of the Court-house and have since thought such a remark might be ambiguous and now hasten to explain it. The columns, the balcony platforms and the brackets seem to justify such an expression most of all. Stone carving of all kinds, and especially when of Classic character, needs to be done in the most skilful and masterly way or *not at all*. It is not a case of "half a loaf is better than no bread," as seems to be the popular opinion, it is a question of whether the bread is to be palatable or not. Every one knows that to make a good salad requires a very distinct knowledge of the proportions of the ingredients, and every architect knows, or should, that the designing of a successful piece of ornament requires a very distinct knowledge of style, of proportion, scale, light and shade, projection of ornament, proportion of ornament to ground, proportion of ground to surrounding surfaces, accompanied by a thorough ability to draw finely. It is not every morsel that is fit to set before a king; it is not every piece of carving that is fit to adorn a building for the people; for decoration should only enhance something that is able to dispense with it and to which it only supplies richness or delicacy. For this reason, we would only suggest such changes on the Court-House as would save it from inferior enrichment and vulgar detail.

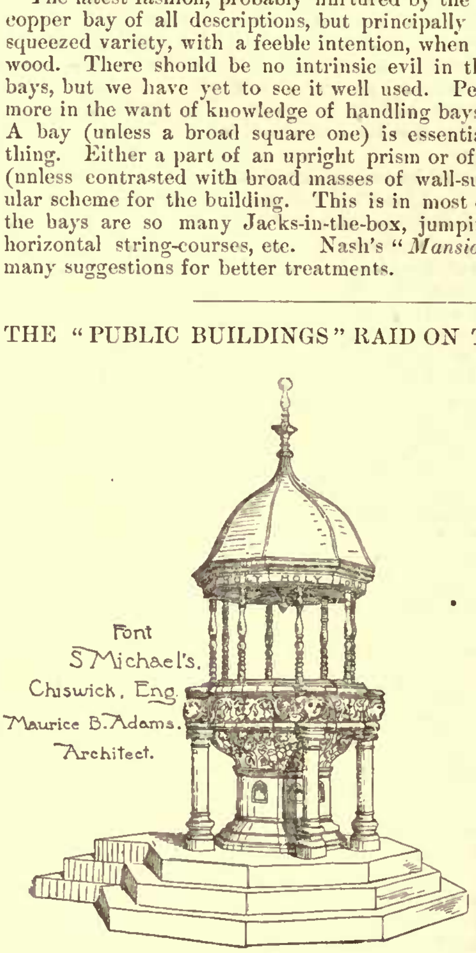
It is not too late to make the main cornice a fine one, studied carefully from Vignola if need be, nor to leave out the panel mouldings and the weathering of joints, which is all out of scale; to lessen the projections of the string courses, which in section do not show their exaggerated overhang on the diagonals when turning corners; to concentrate the three openings on the top story into one, so that that story may have some dignity and not be a mere wall shot full of holes. Apart from this there are several very bad pieces of design. First, the combined corbel, column and balcony which ought to be taken down; second, the openings in the third story of the end pavilions and the pediments over, which ought to be changed; third, the dome, which, as proposed, is very bad—too light at the base, too heavy above, with a pinched, meagre profile and a weak spring—the whole dome utterly unworthy of the mass of building below.

There are domes enough to study from. Brunelleschi's at Florence would seem to suggest that noble simplicity is a virtue in a dome. St. Peter's, inferior as it is to many others, echoes the same principle. St. Paul's, the Invalides at Paris, the numberless Eastern domes, such as the tombs of the Mamelukes outside of Cairo, all point emphatically to the same conclusion, *i. e.*, that a dome should be a geometric unit and not a combination of several geometric forms, and that it should be very firmly planted on a simple base.

The dome is not yet under contract. If the façades cannot be changed or bettered (and we do not believe it is too late for that), at most, they will only be seen from the immediate vicinity and if one has no need of recourse to the law, he need never see them and can try to forget their existence, but to raise a dome into the air that will be seen for miles, this should require a reverent courage, a depth of daring, that should make the architect who attempts it work with cautious hands, for the result will land him or damn him for all time. Finally, though, this has something the nature of an anti-climax, we do not think a French mantel-clock the finest central motive for the sky-line of a façade.

The latest fashion, probably nurtured by the Building Law, is the copper bay of all descriptions, but principally of the straightened, squeezed variety, with a feeble intention, when painted, to resemble wood. There should be no intrinsic evil in the use of copper for bays, but we have yet to see it well used. Perhaps the trouble is more in the want of knowledge of handling bays than in the copper. A bay (unless a broad square one) is essentially a perpendicular thing. Either a part of an upright prism or of a cylinder, and sets (unless contrasted with broad masses of wall-surfaces) a perpendicular scheme for the building. This is in most cases forgotten, and the bays are so many Jacks-in-the-box, jumping up and through horizontal string-courses, etc. Nash's "*Mansions of England*" give many suggestions for better treatments.

THE "PUBLIC BUILDINGS" RAID ON THE TREASURY.



A CORRESPONDENT of the New York *Times* writes as follows: The public building raid upon the Treasury now contemplated, and already begun in the Senate, will take from the Treasury, if it is successful, the sum of $25,000,000. That does not include a number of propositions before the Senate, but not yet before the House, aggregating about $3,000,000. If the House gets all the Bills through which have been introduced by its own members, and also those of the Senate, the appropriations will reach up to about $30,000,000. It is no wonder that Senator Vest said a day or two ago that before the public buildings appropriations the Blair Bill and the Tariff Bill sink into insignificance as plans for reducing the surplus.

It was an easy thing to invent a plan for capturing votes enough in the House to pass every public building Bill reported. There are 325 members with votes. Get 200 of them behind a Bill and it was as good as a law. If a Bill is introduced for a public building in New York, San Francisco, New Orleans or St. Louis, it is sure to get the votes of all the members from each of the States of New York, California, Louisiana and Missouri. If a New York Bill goes in alone, and comes up alone, its merits may be great, but New York alone is greatly interested in it. By extending the plan and inducing Representatives, two, three or four from each State, to introduce Bills, a common interest was aroused. This has been done. One hundred and twenty-three members have introduced Bills. All of these members except four delegates from as many territories have a vote each. They represent all of the States except Delaware, Rhode Island and Nevada. But these States are to be provided for. Rhode Island has two Bills in the Senate. Delaware has one at least. It is not too late for Nevada to get a share of the Treasury surplus, if it thinks it would like to have a public building.

Having gone on introducing Bills as fast as they could be prepared and turned in, the next step was to drive them through the House on the mutual plan. So Mr. Dibble, of South Carolina, who is Chairman of the Public Buildings Committee, has asked for, and, by consent of Mr. Mills, the chosen leader of the majority, will have five

days, beginning February 21, in which all Bills to be indicated by the Public Buildings Committee are to be considered. That means, of course, that they are to be passed. Dilatory motions are to be prevented. That means that no attempt to stop a Bill is to be countenanced, and that the procession of plunder-bearers is to move majestically on regardless of the rules of the House that restrain other measures.

This scheme of wholesale treasure-grabbing is best illustrated by the use of names and figures. The Bills introduced in the House up to February 1 were brought in by the following members:

Abbott, Texas, (2)	Davidson, Fla., (2.)	Lodge, Mass.	Rowland, N. C.
Allen, Mass.	Dibble, S. C., (2)	Maish, Penn.	Rusk, Md.
Baker, Ill.	Dorsey, Neb., (2.)	Mansur, Mo.	Russell, Conn.
Bankhead, Ala.	Dunn, Ark.	Martin, Texas.	Scull, Penn.
Bayne, Penn.	Enloe, Tenn.	McAdoo, N. J., (2.)	Seney, Ohio, (2.)
Biggs, Cal.	Fisher, Mich.	McClammy, N. C.	Simmons, N. C.
Blanchard, La.	Flood, N. Y.	McKenna, Cal., (2.)	Smith, Wis.
Boothman, Ohio.	Ford, Mich.	McKinley, Ohio.	Snyder, W. Va.
Boutelle, Me.	Funston, Kan.	McKinney, N. H., (2.)	Sowden, Penn.
Bowden, Va., (2.)	Gallinger, N. H., (2.)	McRae, Ark.	Stahlnecker, N. Y.
Brewer, Mich.	Gifford, Dakota.	McShane, Neb., (3.)	Stewart, Ga.
Browne, T. H. B., Va., (3.)	Granger, Conn.	Milliken, Me., (2)	Stewart, Vt.
Buchanan, N. J.	Grimes, Ga.	Moffitt, N. Y.	Struble, Iowa.
Burrows, Mich.	Grout, Vt.	Morrill, Kan.	Symes, Col., (2.)
Butler, Tenn., (2.)	Guenther, Wis.	Morrow, Cal., (2.)	Tarsney, Mich.
Bynum, Ind.	Heard, Mo.	Morse, Mass.	Thomas, Ky.
Campbell, J. E., Ohio.	Henderson, N. C.	Neal, Tenn.	Thompson, Ohio.
Campbell, T. J., N. Y.	Hermann, Oregon, (2.)	Newton, La.	Thompson, Cal.
Carey, Wyoming.	Hiestand, Penn.	Nelson, Minn.	Toole, Montana.
Caruth, Ky.	Hires, N. J.	Norwood, Ga.	Vandever, Cal., (2.)
Caswell, Wis.	Hogg, West Va., (2)	O'Donnell, Mich.	Warner, Mo.
Catchings, Miss.	Holman, Ind.	O'Neall, Ind.	Weber, N. Y.
Compton, Md.	Holmes, Iowa.	Osborne, Penn.	West, N. Y.
Cox, N. Y.	Hopkins, Va.	Owen, Ind.	Wilber, N. Y.
Crain, Texas.	Hovey, Ind.	Parker, N. Y.	Wilkins, Ohio.
Crouse, Ohio.	Howard, Ind.	Perkins, Kan.	Williams, N. Y.
Culberson, Texas.	Joseph, New Mexico.	Perry, S. C.	Wilkinson, La.
Cutcheon, Mich., (2.)	Ketcham, N. Y.	Peters, Kan., (3.)	Wilson, Minn.
Darlington, Penn.	Lawler, Ill.	Phelps, N. J.	Wise, Va.
	Landes, Ill.	Rice, Minn., (2.)	Yost, Va.
	Lehlbach, N. J.	Robertson, La.	Yoder, Ohio.
		Rogers, ..rk.	

Three new members — T. H. B. Browne, of Virginia, Peters, of Kansas, and McShane, of Nebraska — are the leaders in the list. Each has introduced three Bills. Abbott, of Texas, Bowden, of Virginia, Hogg, of West Virginia, McKinney, of New Hampshire, Rice, of Minnesota, and Vandever, of California, also all new, have introduced two Bills each. The old members are satisfied if they can introduce and get through one Bill in a term of two years. The Bills came in from fifty-nine Republicans and sixty-three Democrats, and one Independent — Smith — is among the aspirants for local fame in this way. The 123 members ask for one hundred and forty-nine new buildings, as follows:

Akron, Ohio.	$100,000	Garden City, Kan.	$100,000	Oakland, Cal.	$250,000
Albuquerque, New Mexico.	100,000	Gr'd Haven, Mich.	100,000	Olney, Ill.	75,000
Alexandria, La.	100,000	Grand Island, Neb.	100,000	Omaha, Neb.	1,500,000
Allegheny, Penn.	200,000	Greenville, S. C.	100,000	Onancock, Va.	25,000
Allentown, Penn.	100,000	Hamilton, Ohio.	100,000	Oneonta, N. Y.	75,000
Altoona, Penn.	150,000	Helena, Ark.	80,000	Palestine, Texas.	75,000
Annapolis, Md.	50,000	Helena, Montana.	100,000	Paterson, N. J.	100,000
Atchison, Kan.	100,000	Hoboken, N. J.	100,000	Pensacola, Fla.	50,000
Atlanta, Ga.	75,000	Hot Springs, Ark.	50,000	Piqua, Ohio.	60,000
Atlantic City, N. J.	100,000	Houlton, Me.	50,000	Plattsworth, Neb.	40,000
Asheville, N. C.	100,000	Hudson, N. Y.	100,000	Pt. Pleasant, W. Va.	75,000
Baltimore, Md.	650,000	Huntington, W. Va.	100,000	Portland, Oregon.	500,000
Bar Harbor, Me.	50,000	Hutchinson, Kan.	100,000	Portsmouth, Ohio.	60,000
Bay City, Mich.	250,000	Indianapolis, Ind.	125,000	Pueblo, Col.	200,000
Baton Rouge, La.	100,000	Jackson, Mich.	100,000	Racine, Wis.	100,000
Beatrice, Neb.	40,000	Jackson, Tenn.	1,000	Roanoke, Va.	100,000
Birmingham, Ala.	500,000	Jeffersonville, Ind.	25,000	Sacramento, Cal.	150,000
Boston, Mass.	250,000	Jersey City, N. J.		Saginaw, Mich.	200,000
Bridgeport, Conn.	200,000	Kalamazoo, Mich.	100,000	St. Albans, Vt	75,000
Bridgeton, N. J.	50,000	Kansas City, Kan.	100,000	St. Paul, Minn.	
Brownsville, Tex.	60,000	Kansas City, Mo.	1,000,000	Salem, Oregon.	100,000
Bristol, Tenn.	20,000	Keene, N. H.	100,000	San Diego, Cal.	150,000
Brunswick, Ga.	100,000	Lancaster, Penn.	125,000	San Francisco, Cal.	850,000
Charleston, S. C.	400,000	Lansing, Mich.	100,000	San Francisco, Cal.	400,000
Charleston, W. Va.	52,000	Lima, Ohio.	50,000	Schenectady, N. Y.	75,000
Charlotte, N. C.	200,000	Logansport, Ind.	75,000	Sedalia, Mo.	75,000
Chattanooga, Tenn.	300,000	Los Angeles, Cal.	178,500	Sioux City, Iowa.	300,000
Chester, Penn.	75,000	Louisville, Ky.	10,000	Sioux Falls, Dak.	100,000
Cheyenne, Wy.	80,000	Lowell, Mass.	250,000	Springfield, Mo.	100,000
Chicago, Ill.	200,000	Lynn, Mass.	100,000	Statesville, N. C.	150,000
Columbus, Ga.	150,000	Madison, Ind.	75,000	Staunton, Va.	75,000
Dallas, Texas.	12,000	Malone, N. Y.	20,000	Stillwater, Minn.	100,000
Defiance, Ohio.	25,000	Manchester, N. H.	46,000	Stockton, Cal.	85,000
Denver, Col.	1,000,000	Manchester, Va.	50,000	Suspension Bridge, N. Y.	150,000
Dover, N. H.	100,000	Manistee, Mich.	50,000	Tallahassee, Fla.	75,000
Duluth, Minn.	300,000	Maysville, Ky.	50,000	Texarkana, Ark.	100,000
E. St. Louis, Ill.	40,000	Milwaukee, Wis.	1,200,000	Texarkana, Tex.	50,000
Elmira, N. Y.	150,000	Moberly, Mo.	75,000	Tiffin, Ohio.	30,000
Eureka, Cal.	60,000	Monroe, La.	100,000	Vicksburg, Miss.	125,000
Evansville, Ind.	100,000	Morristown, Tenn.	20,000	Vincennes, Ind.	75,000
Fayetteville, N. C.	75,000	Muskegan, Mich.	100,000	Washington, D. C.	800,000
Findlay, Ohio.	30,000	Nashua, N. H.	100,000	Watertown, N. Y.	120,000
Fond du Lac, Wis.	50,000	Newark, N. J.	250,000	Wichita, Kan.	100,000
Fort Dodge, Iowa.	100,000	New Berne, N. C.	100,000	Wilkesbarre, Penn.	150,000
Fortress Monroe, Va.	10,000	New London, Ct.	150,000	Winfield, Kan.	50,000
Fort Worth, Tex.	130,000	N. Orleans, La.	1,500,000	Winona, Minn.	200,000
Fredericksburg, Va.	50,000	Newport News, Va.	100,000	Yonkers, N. Y.	100,000
Fremont, Neb.	100,000	Newport, Vt.	50,000	York, Penn.	150,000
Gallipolis, Ohio.	25,000	New York, N. Y.	1,500,000	Youngstown, O.	150,000
		New York, N. Y.	250,000	Zanesville, O.	150,000
		Norfolk, Va.	250,000		
Total					$24,994,500

The table below gives the number of buildings proposed for each State, with the total prizes for the States:

	Number of Buildings Proposed.	Estimated Cost of New Buildings.		Number of Buildings Proposed.	Estimated Cost of New Buildings.
Alabama	1	$500,000	Nebraska,	5	1,780,000
Arkansas	2	230,000	New Hampshire	4	346,000
California	8	2,123,500	[1]New Jersey	0	600,000
Colorado	2	1,200 000	New York	10	2,665,000
Connecticut	2	350,000	North Carolina	5	625,000
Florida	2	125,000	Ohio	11	780,000
Georgia	3	325,000	Oregon	2	600,000
Illinois	3	315,000	Pennsylvania	7	950,000
Indiana	6	475,000	South Carolina	2	500,000
Iowa	2	400,000	Tennessee	4	341,000
Kansas	6	550,000	Texas	5	327,000
Kentucky	2	60,000	Vermont	2	125,000
Louisiana	4	1,800,000	Virginia	8	660,000
Maine	2	100,000	West Virginia	3	227,000
Maryland	2	700,000	Wisconsin	3	1,350,000
Massachusetts	3	600,000	Dakota	1	100,000
Michigan	8	1,010,000	Montana	1	100,000
[1]Minnesota	4	600,000	New Mexico	1	100,000
Mississippi	1	125,000	Wyoming	1	80,000
Missouri	4	1,250,000	District of Columbia	1	800,000
Total				149	$24,994,500

A prominent Eastern Republican, whose attention was directed to the fact that the Fiftieth Congress was preparing to make an extraordinary record for the passage of public building Bills, answered that it would be found that most of them were for Southern cities. Well, look at the following analysis and see if that is true. Take the Eastern States first:

	Proposed Buildings.	Total Cost.
Connecticut	2	$350,000
Maine	2	100,000
Massachusetts	3	600,000
New Hampshire	4	346,000
Vermont	2	125,000
Total	13	$1,521,000

The Middle States expect to draw more and richer prizes. Their share is as follows:

	Proposed Buildings.	Total Cost.
New Jersey	6	$600,000
New York	10	2,665,000
Pennsylvania	7	950,000
Total	23	$3,315,000

The West cries for the lion's share of the plunder, and asks for these appropriations:

	Proposed Buildings.	Total Cost.		Proposed Buildings.	Total Cost.
California	8	$2,123,500	Michigan	8	1,010,000
Colorado	2	1,200,000	Minnesota	4	600,000
Illinois	3	315,000	Nebraska	5	1,780,000
Indiana	6	475,000	Ohio	11	780,000
Iowa	2	400,000	Oregon	2	600,000
Kansas	6	550,000	Wisconsin	3	1,350,000
Total				60	$11,183,500

This is the share of the South:

	Proposed Buildings.	Total Cost,		Proposed Buildings.	Total Cost.
Alabama	1	$500,000	Missouri	4	1,250,000
Arkansas	2	230,000	North Carolina	5	625,000
Florida	2	125,000	South Carolina	2	500,000
Georgia,	3	325,000	Tennessee	4	341,000
Kentucky	2	60,000	Texas	5	327,000
Louisiana	4	1,800,000	Virginia	8	660,000
Maryland	2	700,000	West Virginia	3	227,000
Mississippi	1	125,000			
Total				48	$7,795,000

The territories and the District of Columbia come in for a small share:

	Proposed Buildings.	Total Cost.
Dakota	1	$100,000
District of Columbia	1	800,000
Montana	1	100,000
New Mexico	1	100,000
Wyoming	1	80,000
Total	5	$1,180,000

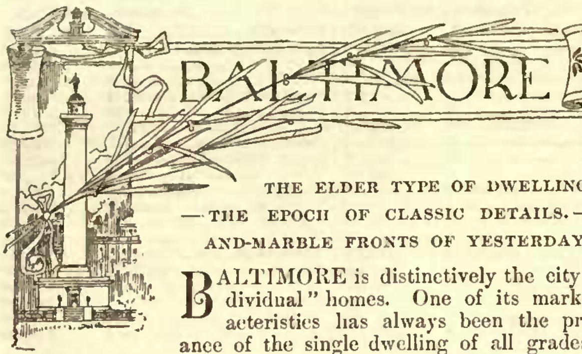
SUMMARY.

	Buildings.	Total Cost.
Eastern States	13	$1,521,000
Middle States	23	3,315,000
Western States	60	11,183,500
Southern States	48	7,795,000
Territories	5	1,180,000
Total	149	$24,994,500

Does any one doubt, after reading this chapter, that a large surplus in the Treasury is demoralizing to legislators, or that the Fiftieth Congress is more anxious to spend money than it is to reduce taxes.

E. G. D.

[1] The estimates for the public buildings at St. Paul, Minn., and Jersey City, N. J., are not furnished. The Senate bill for St. Paul calls for $1,200,000, and the Jersey City building may be put at $250,000 to $500,000.



THE ELDER TYPE OF DWELLING-HOUSE. — THE EPOCH OF CLASSIC DETAILS. — BRICK-AND-MARBLE FRONTS OF YESTERDAY.

BALTIMORE is distinctively the city of "individual" homes. One of its marked characteristics has always been the preponderance of the single dwelling of all grades — from the homes of the millionaire standing alone, down to those of the day-laborer, built in blocks of from three to thirty. Ten years ago either the typical tenement-house or the modern "flat" was unknown, and they are still so few in number and so abortive in arrangement, that neither the extreme evils of the one nor the advantages of the other have, as yet, been thoroughly developed. It is the private dwelling, then, that here first demands our attention, and it may be the traditional spirit of conservatism in this old city that tempts us, even in architecture, to still linger — perhaps not altogether idly — among the good things of the past rather than at once to deal with the more practical questions of the present or the prospects of the future. For, when one thinks of the "good old houses of fifty years ago," referred to in the Baltimore letter of last month, or when we look upon the calm and dignified faces of some of these worthy old citizens of a former generation, now too often abandoned to ignoble uses and neglect, patiently waiting their ruin under the invading tide of impudent upstarts pressing upon them from every side, when we walk through their ample halls and rooms, and over their broad and easy stairways, we cannot but dwell upon the fact of how really genuine and good they were, in the light of their own day and generation, and what comfortable homes they made in all that the life of refined and cultivated people then asked for.

True, they could boast of no plumbing worthy of the name — no gas — rarely a furnace, and the present "butlery," with its very ship-shape concentration of modern conveniences in some stolen corner, can look back at its progenitor, the "housekeeper's-room," as of quite wasteful dimensions, while the place of closets was nearly altogether supplied by "wardrobes" and "clothes-presses" and "chests," and most satisfactory pieces of furniture they were, too, both to use and to look upon. That dark age of constructive and decorative immoralities and abominations had not yet settled upon the world, whose crying evils finally called forth such reforms as "Eastlake" and "Queen Anne," and, alas! all the later slanders and traductions that have been done in their sacred names. Bricks and mortar, stone and wood and iron were generally used, each in its fitting place, and were not subjected to the humiliating office of imitating each other. Wide, open fireplaces lead into real flues, and doors and windows did not shrink and rattle. All this was true even for the houses which, although about twenty-five or thirty feet broad, were in those days regarded as quite modest and unassuming dwellings, renting at the moderate rate of two or three hundred dollars a year. But the type has entirely disappeared from among the erections of recent years. Hundreds are still standing all through the older parts of the town, and most respectable and well-preserved specimens they are, too, but under the anathema of "old-fashioned" their few frailties are derided and their many merits overlooked.

Immediately succeeding this type, some forty odd years ago or more, there appeared a very distinctly different style of design in the house-front that quite generally prevailed for the better class of dwellings for a short period, and nearly all the examples of which are still standing in unimpaired freshness, scattered through the better streets near the centre of the city still reserved for private residences.

This first change was by no means one of retrogression, but rather a renaissance of more strictly Classical and monumental proportions, as a reaction after the somewhat *ad libitum* and attenuated use of colonial details.

These houses, usually slightly separated from their neighbors on either side, had broad façades of brick with simply treated and well-disposed openings — a good Classical cornice crowning the whole — and the chief ornamental feature being an admirably proportioned Doric or Ionic portico of white marble, usually projecting — sometimes merely *in antis*, and rather of Greek than of Roman feeling in detail. This portico, only over the main entrance and of the same height as the principal story of the building, is altogether a most effective and appropriate thing in its place, of just such degree of monumental dignity as may fittingly belong to a private residence, without being sufficiently obtrusive to suggest a public building — and it is altogether a distinct thing from that typical, ill-proportioned, ante-bellum portico of the South, extending through two or three stories over the entire front of the house, and of which there are a few examples here, as there are also in more Northern towns. On the other hand, so good are these bits of Greek reproduction in Baltimore that their merits seldom fail to attract the attention of the architectural connoisseurs from other cities, and, indeed, we do not know of anything quite so good of the kind and of that period in New York, Philadelphia or Boston. One peculiar feature about these successful designs is that usually the name of no particular architect is connected with any of them, and, perhaps, the name of architect was never connected with the men who built them, but, be this as it may, if the same knowledge of Classical proportions and details, and the ability to so intelligently reproduce them were possessed by half the men who claim the name of architect to-day, the world would be the better for it.

A word should be said here in passing in commendation of some few of the quite excellent façades to public buildings, somewhat antecedent to, or of about the same period as these houses. More particularly do we note only two or three. First, the little granite building on East Baltimore Street, originally erected for a school, and which is a complete little Greek Doric temple, barring the windows in its side walls. About a mile to the west of this, on the corner of St. Paul Street and Court-house Lane, is an admirable piece of refined Doric, forming the front of an old Court building, a mere screen to the totally insignificant structure behind it, but a very beautiful screen for all that. A ten minutes' walk farther on brings us to the corner of Charles and Franklin Streets and to that often-commended piece of Italian Classic, the Unitarian Church, a most agreeable bit of architecture for the eye to rest upon at all times and never more so than on a clear summer day, its round arches framed in by the thick dark-green vine closely clinging to its red-gray stucco walls, the sharp, square corner of its roof-line and the low dome above against a deep blue sky, with the tall white-marble columns of its opposite neighbor, the Athenæum Club, in the foreground. By moving a few steps only from this point, we obtain a view of the rear of the Roman Catholic Cathedral, a building certainly of very dignified and imposing effect, notwithstanding the fact that it is a curiously composite structure, a rather severe, Romanesque, round-arched building of granite, to which has been added a huge Doric portico in brownstone, with columns reproduced from those of the Erectheum, and the whole surmounted by two small towers crowned with domes of Moorish form. In spite of these seeming incongruities, the Cathedral and its various dependent buildings, including the Archbishop's residence, now known as the Cardinal's "Palace," which form a group which from some points of view is strikingly picturesque and with a decided foreign suggestion about it.

Here, too, we would appropriately speak of Baltimore's objects of special pride, the Battle and the Washington Monuments, had they not both been so recently and so ably criticised in the *American Architect* and the latter assigned to the honorable place of second only in point of design among the monuments of modern times and of all lands.

And now, with the close of this period of the "Classic portico," about the middle of the century, even the most friendly spirit of criticism must turn to all that follows for the next twenty-five years with shame and acknowledge not only that it finds no place for commendation, but rather that the kindest charity might say, in all that was done, there was really nothing to criticise. To a certain extent this was true for the same period in all our cities; it was the most debased age of American architecture over the whole country, but in Baltimore the fact seemed more glaringly emphasized than elsewhere. All the good things that had gone before seem to have left no results behind them in the taste of the builder or of the public, beyond suggestions for the most absurd misuse of their weakest points and entire neglect of the better ones. Any desire for decorative effects was satisfied with cheap and pretentious shams and a profusion of perfectly meaningless ornamentation. First, the white-marble portico was most cleverly imitated in painted wood, the due proportions so closely copied that the deception was not at first apparent, till little by little the details lost all suggestion of the Classic, the good "Flemish bond" gave place to the mere four-inch-thick pressed-brick screen of the smoothest and reddest of bricks and the finest and whitest of mortar joints as a facing to a very poor wall behind it, while cornices and windows and door lintels and sills of white marble or painted wood, with mouldings conceived in the carpenter's shop, formed the "trimmings."

The only variation in the type was here and there a "brownstone front," whose even coarser details, cut in the rapidly disintegrating Connecticut stone, possessed the sole merit of speedily crumbling away and adding that unintentional interest to the façade which is usually associated with a ruin. By the score these architectural abominations arose and cumbered the ground in the best streets of the town, and there they still stand, still accepted by some few people as the climax of architectural perfection. But even this popular approval after a quarter of a century was not proof against the ever popular cry for "Novelty," and it was to meet this demand, and also impelled by the dawning spirit of disgust for what had so long obtained and a knowledge of better things, that one or two architects timidly ventured to pioneer a few "Eastlake" and "Queen Anne" designs into the community. Evil day! for the enterprising builder, eagerly seizing upon the suggestion of all the novel possibilities in the style, flooded the city with an array of cheap and small houses with every imaginable form of gable and turret and bay, moulded-brick and terra-cotta applied with conspicuous lack of intelligence, and with interiors so overcharged with corner cabinets and fireplaces (real or sham), fanciful newel-posts and spindle screen-work, and with possibilities for portières so unlimited as to satisfy

the æsthetic aspirations of the most artistic housekeeper. Even the better things aimed at by the architects had little more of real merit to commend them.

The story is now an old one, a well-worn theme with slight variations in different cities. Like the evil things that came before it, this style is still flourishing in our midst with wonderful vitality and prolificness. But the inevitable reaction is also here, with strong evidence that its steps are at last turned in the right direction, and already there is once more to be seen in the streets of Baltimore not only a vast amount of building, but also some architecture.

SOCIETIES

NEW YORK ARCHITECTURAL LEAGUE.

AT a regular meeting of the Architectural League of New York held Monday, February 6, 1888, it was

Resolved, that a Committee of Five be appointed, of which the President shall be one, to present the following protest in person:

To the Commissioners of the Sinking Fund, Abraham S. Hewitt, Mayor and Chairman: The Architectural League of New York most respectfully protests against the terms of the competition announced by your honorable body under "an Act to provide for the erection of a building for Criminal Courts and other purposes in the city of New York." In our judgment a competition of such magnitude demands careful preliminary consideration at the hands of professional *advisers* of known ability; and we respectfully urge that the terms be modified through such agency even at this late day. We submit that it is only by such action that men of acknowledged reputation commensurate with the dignity and importance of the municipality can be secured as competitors.

J. BEVERLY ROBINSON, *President*,
FRANK A. WRIGHT,
A. H. THORPE,
WM. B. TUTHILL,
FRANK WALLER, *Committee.*

COMMUNICATIONS

CEMENT FOR THE CONCRETE FOUNDATIONS OF THE CONGRESSIONAL LIBRARY BUILDING.

NEW YORK, February 4, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — In your issue of this date, you remark upon the report presented by Mr. J. L. Smithmeyer to the United States Senate on January 4th, which gives his reasons for the rejection of the Portland cement furnished for the concrete foundation of the Congressional Library Building, and your editorial has the color of an endorsement of his action. There are two sides to every controversy, and the contractor for the work has yet to be heard from. Knowing something of the *status quo*, and assured that you act upon the principle *Fiat justitia, ruat cœlum*, I trust you will give this communication equal publicity to vindicate the reputation and integrity of those affected.

The first lot of cement purchased by the contractor was Black Cross Portland, as it had proved a safe cement for concrete, and was endorsed by eminent engineers and contractors. The report made by the inexperienced person employed by Mr. Smithmeyer to test cement being incorrect, it was not considered, and tests were made by Capt. T. N. Symons, U. S. Engineer Corps, and A. G. Menocal, of the Washington Navy Yard, which demonstrated that the cement exceeded the architect's specifications, viz.: To stand a tensile strain of three hundred pounds on the square inch at age of seven days and leave not more than ten per centum residuum on a sieve of twenty-five hundred meshes to the square inch. Captain Symons reported that the cement set in five minutes, and therefore it should be condemned. Mr. Menocal reported that the cement set in twenty-five minutes, and passed no opinion.

Investigation of the methods employed for testing the set of cement by Captain Symons proved that the gauger was not accustomed to test Portland, his time being more especially devoted to testing the slow-setting natural cements of which large quantities are used in the District. After mixing up sufficient Black Cross to make a bar briquette and pressing it into the mould, it was shaken out upon absorptive paper, the entire operation consuming less than three minutes. The cement was then tapped with the finger, and when it failed to take an impression, it was considered set. On this method of testing for set, the cement is condemned by Mr. Smithmeyer. An expert or one familiar with cement recognizes that to shake cement out on absorptive material draws out the moisture quicker than is intended and a scale will form sufficient to prevent an impression being made by the finger-tip; further, the warmth of the finger will tend to dry out the cement at that point. It was suggested that if the quick setting of the cement was due to faulty manufacture the tensile strength at longer date would give some indication of it, and therefore further briquettes were made up at the same time and broken at seven days and thirty-five days, with the result of four hundred and fifty-six pounds and five hundred and one pounds respectively on the square inch, conclusively proving that the set registered was incorrect and that the cement was safe and sound. In the report submitted by the architect, no mention is made of this fact which is on record. The contractors not being permitted to use Black Cross, and another cement that the architect ordered them to obtain being also condemned, it became necessary to present the matter last November before the Library Commission. The Chairman, Secretary Lamar, decided that Gen. M. C. Meigs should test and report on the cement for which his practical knowledge well fitted him.

On December 2d, General Meigs reported in the following words: "The Black Cross cement has a tensile strength of five hundred and fifty-nine pounds to the square inch at age of seven days, much more than the specifications require. In regard to rate of setting, I find it, as intimated on Block 12, a quick-setting cement, stiffening in twenty-five minutes after beginning to temper it with water. This morning I tempered a batch of it, and after waiting some time, took it down stairs to my office. After mixing it in the second story, I forgot to look at it again till after the lapse of eighty-four minutes. It then took some pressure to make a distinct impression on it with a three-sixteenths inch brass wire, but it was easily written on with the point of a pen-knife. I am of the opinion that skilful workmen will be able to make a strong concrete of Black Cross cement."

The cement, therefore, did not fall below the required tensile strength, as the types unfortunately state in your editorial, and when it can be written upon with the point of a knife eighty-four minutes after mixing, it is not a quick-setting and a dangerous cement.

A request to permit the placing of some concrete made with this cement according to specifications *in situ* and its action watched was refused by the architect, although accompanied with the offer that if the concrete was condemned it should be replaced with cement he selected. As cold weather was approaching, when no work could be done, the concrete would have several months of severe trial, and the rejection of the offer was unreasonable.

When this cement is being used by the contractors for the Croton Aqueduct (all of which is subjected to a rigid test by the engineers, as it is employed in situations exacting more than is required in the Congressional Library foundations), and not a single complaint has been made of the twenty-five thousand barrels already delivered, it is incredible that it is the worthless material the architect imputes it to be, and there is foundation for the assertions which your article intimates have been circulated in press dispatches all over the country. The reputation of a well-known manufacturer and the honor of an importing merchant are not to be lightly impeached, even by the political influence that has been brought to bear in this case.

Yours truly, HOWARD FLEMING.

NEW YORK, N. Y., February 8, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — In your issue of February 4, you refer editorially to the tests of Portland cement made by Mr. Smithmeyer, architect of the Congressional Library Building, and his rejection of cements purchased by the contractors. Those tests have already been made the subject of much controversy, and we should not refer to them again had the article not shown such strong prejudice in favor of the architect, while manifestly ill-advised as to the facts.

We represent, as sole agents for the manufacturers, one of the cements referred to. The one mentioned by you as "perhaps the oldest and best known in this country of all the Portland cements," and while we have never questioned the integrity of the architect in his unbiased desire to secure a suitable cement for his purpose, we do impeach his specifications and his ability to test cement even under those specifications. He states that owing to the peculiar nature of the soil a concrete of high tensile strength became a necessity, hence, he formulated such specifications as to cement as, in his opinion, would secure an article sufficiently good to accomplish that end, and placed his reliance upon a tensile strength of three hundred pounds per square inch when mixed neat.

Now, we submit that Portland cement is never used neat, and that tests of neat cement are no criterion whatever of its value for making concrete. A cement to be used for concrete should be tested as to its ability to carry the sand with which it is mixed, and that ability cannot be shown by neat tests. This has been clearly demonstrated by the experience of the New York Department of Docks, the Boston Sewerage Department, and, in fact, wherever the testing of cement has been made an intelligent study; such authorities would not accept a neat test as evidence of practical value.

If, then, the tests prescribed by the architect are incapable of demonstrating the value of the cement for practical purposes, as in concrete or mortar-making, they are worthless as a safeguard and unjust to the cement in not giving it an opportunity to show what it is good for.

Giving the architect credit for his expressed determination to secure a concrete foundation sufficiently strong, if he did not provide proper tests to guarantee that, it is fair to presume that the specifications he did formulate indicate the limit of his knowledge of Portland cement.

The testing of cement is a very delicate operation and necessitates great care and that knowledge which is only the result of experience. It is no reflection upon architects, therefore, when we say that very few of them have any practical knowledge of making such tests.

Inequalities in tests can be mainly attributed to slight variations in treatment by the tester. At the cement manufactories, where the persons employed solely to make tests become adepts at that business, they make and break briquettes all day without varying over ten pounds, but when that same cement goes out to the trade and gets into less skilful or less careful hands, the tests show much greater inequalities.

Taking up the tests reported by the architect as having been made in his office and upon which the cement was rejected, we find an irregularity that it is impossible to obtain except through incompetence or gross carelessness on the part of the tester, and we venture to say that no expert in the country will corroborate those tests, nor has Mr. Smithmeyer been able to secure any corroboration of them even among departments to which he has himself submitted samples of the cement. The first tests reported by the architect as made in his office last October, show a range from two hundred and ninety pounds, the highest, to thirty-nine pounds, the lowest, a variation of two hundred and fifty-one pounds, while on the previous day tests of cement, taken from the same lot, by the Engineer Department, District of Columbia, show a range from three hundred and six to two hundred and twenty-six pounds, a variation of only eighty pounds.

The following month tests were again made in the architect's office, and at the same time at the Washington Aqueduct and United States Navy Yard. Again the architect's office discovers far greater inequality than either of the others. About that time it should have dawned upon the architect that some one in his office was at fault, instead of which he lays great stress upon that irregularity as showing the poor quality of the cement.

It is a significant fact that the separate tests made at the United States Navy Yard, by different persons, each averaged higher than the tensile strength required by the architect's specifications and the tests made at the Engineer Department, November 29, also averaged higher than required. The question then arises, why did the tests in the other departments fall short of that? Was not the cement as good? Unquestionably it was.

The particular lot in question was imported by us in one cargo direct from the factory, and reshipped by us to the contractor directly from import vessel. It is all alike, presumably made at the same time and is of uniform quality. It is fair to presume, then, that difference in treatment at the separate bureaus and difference in the care with which the tests were made was what occasioned the difference in result. It is held by good authorities that the highest test a cement will stand should be considered its strength. If, in other tests, from same sample, they fall below that, it is proper to consider that in some part of the process the tester has been at fault in making or breaking the briquettes. Of the one hundred and fifty-six tests made in the architect's office, only three exceeded three hundred pounds, the remainder straggled away down to thirty-nine pounds with absurd irregularity: of the twenty-nine tests made at the same time at the Engineer Department, Navy Yard and Washington Aqueduct, fourteen exceeded three hundred pounds, or, in other words, two per cent of the architect's tests and fifty per cent of the tests made in other departments exceeded the requirements, we should like to hear the architect's explanation of that difference. Finally, we protest against this cement, recognized in all the markets of the world as a standard of high quality, being made the victim of ignorance, and we maintain that the cement is eminently well fitted for the purpose for which it was purchased, and nothing has yet been shown to the contrary. Yours respectfully, Sinclair & Babson.

NOTES AND CLIPPINGS

The Action of Sea-Water on Cast-Iron Piles. — The chief engineer B. B. and C. I. Railway in reporting on the condition of the superstructures of certain of that company's wrought-iron girder bridges, says, according to *Indian Engineering*, that having considered the question of the stability of those bridges, and as the condition of the cast-iron columns forming the piers supporting them was necessary for the purpose and had to be satisfactorily ascertained it was therefore decided to dismount and take up for examination a pile-column, which had been erected during original construction, from one of the piers of the South Bassein Bridge. Accordingly the 3d column of piers No. 37 of the South Bassein Bridge was selected as being one of the original and undisturbed columns of the bridge. Mr. Hargrave, Resident Engineer, who conducted the examination states that this column was screwed into position in the year 1862, and hence its present age may be taken at 25 years, when the column was extracted. On examining the individual piles of which it was constructed, two of the piles were found almost as fresh in appearance as when originally put in place. In order to determine as far as possible the exact condition of the metal of the piles, he had specimens cut from each pile that was considered likely to be affected to any extent by corrosion. The specimens cut from the two piles referred to, show no corrosion; of those specimens cut from a third pile immediately over one of the latter, some show no corrosion while others have been corroded, but the greatest depth of this corrosion measured does not exceed 3-32 of an inch. The corrosion is greatest in specimens taken as they approach low water mark. As to the pile bolts they are as good as the day they were put in place. The lesson to be learned from this experiment is that the greatest corrosion in the piles exist close to low water, and does not extend to any considerable depth underneath it; the same has been observed in the case of the bolts and bracings. If this column can be taken as representing the average condition of the remainder of the columns in this bridge, we are in a position to state that after a period of 25 years other pile columns in a salt waterway are in a very good condition, and that the piles where corrosion has been found are in a position which can easily be got at for examination or renewal. This experiment further set at rests all groundless fears as to the speedy deterioration of pile columns from the action of sea water. The result of these examinations of the company's bridges is, therefore, most reassuring and highly satisfactory. The specimens have been put up in a case, which will be kept in the boardroom for future reference, when possibly 25 years hence another column may be examined and the results compared.

TRADE SURVEYS

Perhaps the most instructive review that could be written at this time concerning the industries, railroad and commercial affairs and finances would be a simple enumeration of new enterprises, new combinations, new loans, and evidences of reviving activity in all channels of trade and commerce. Those who keep track of new work and new movements of all kinds know that, even with all the admonitions to go slowly and to beware, there is an enormous amount of new work in contemplation. To go no farther than the journals of the country, in all branches of trade we find abundant evidences of prosperity and of coming activity. Columns and pages of new enterprises of additions, alterations and of improvements are furnished, and the reliability of these statements is tested by the replies of builders, contractors and material-men, who for the past two weeks have begun to close engagements for the season to begin April 1st, and in some sections of the country sooner. The year 1888 will be far from being a booming year, but it will not be such a year of depression as those who rely upon the railroad-building barometer are prepared to expect. Even this barometer may rise. Just now twenty-five per cent of the producing capacity has been purchased, and there are inquiries sufficient in the market to double that figure if the inquiries result in business. As regards the railroad situation, so far as the construction of new roads and earnings of existing roads are concerned, it is only safe to say that all predictions looking to restriction are made without a thorough understanding of the facts. As to railroad earnings, they must of necessity increase. Even in the Northwest, where a sixty to seventy per cent cut has been made within a few weeks, there are healthful underlying conditions which will shortly assert themselves. Could such wars extend all over the country it might be better for the railroads themselves in the long run. Traffic is not bearing the highest rate it will endure, but it is not carried at the lowest rate that is possible. Cheap freight rates are very important factors in the development of business, and this is a factor which has been overlooked. If railroad building has suffered, it is not because of insufficient traffic to make legitimate earnings, but for other and less creditable reasons, in which stock-jobbing manipulations and freight-wars have prominently figured. The public has but little to lose, if anything, by wars of the kind now going on in the Northwest, yet it is to be regretted that there are no other means by which the lowest possible freight rates can be ascertained and maintained. The Southwestern traffic association fears a repetition of the Northwestern contest, but the trunk lines east of Chicago have made themselves safe against any such disasters. Probabilities point to lower passenger and freight rates on the entire railway system of the United States. Influences are at work improving the management and making it more honest if not more capable. Large loans have been made within a week or two and there are now more railway securities upon the market than there has been for many months. Foreign purchases are large and the buying demand seems to be equal to all railway-building requirements. Good loans are easily placed. Railroad building will not decline on account of a scarcity of money, nor for poor crops, nor on account of declining employment or decreased earning capacity of the country. Every influence points in the other direction, although there may be some little conservatism displayed by builders this year. References have heretofore been made to the expansion of mining capacity. The capacity of the iron and steel mills is being improved, and since the first of the year a host of improvements have been either undertaken or announced. Hardware manufacturers are also expanding their facilities. Several new works are to be established in the West. A great many of them will look particularly to the wants of the farming community and to the developing manufacturing communities of the Mississippi Valley. The multitude of little industries starting up there are promising, and the bulk of them are on the solid foundations of individual earnings and the experiences of the possessors of these small amounts of capital. New Englanders are reaching out westward and southward, and are quick to secure and utilize the opportunities of these new regions. Architects, builders and manufacturers of material are following in the wake of new railroad enterprise and are contributing their share to the rapid development of the country west of the Mississippi River. It has been stated recently on good authority that 400 lumber-yards have been established in four States west of the Mississippi River, 200 foundries, over 100 machine-shops, besides several large railway equipment and repairing establishments, to say nothing of innumerable small shops employing from five to twenty men. Western trade and manufacturing journals call particular attention to this phase of development and offer it as an inducement to Eastern capitalists for the increase of investments. It is certainly encouraging to observe the rapidity with which small individual operators or business men can plant themselves and extend their business in a short time. Conditions throughout the West and South must certainly be very healthful. This fact is proved by the steady expansion of trade. Missouri, Iowa, Nebraska and Colorado are all feeling the influence of manufacturing enterprise. The production of the precious metals is not increasing as rapidly as the expenditure of money for new machinery would seem to call for. There is an urgent demand for a great deal of machinery for hydraulic purposes for establishment of water, gas and electric facilities and for the utilization of water-power in the South. Perhaps the steadiest business this year will be that of the manufacturers of boilers and engines and general machine work. Whatever may come to other industries, it seems very probable that the workers in this branch of industry will have their hands full and their shops full throughout the season. Some establishments in the South are now sold three to four months ahead. In the Northern States there is less work already booked, but sufficient work in sight to induce manufacturers to write and talk very hopefully concerning the future.

S. J. Parkhill & Co., Printers, Boston.

THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. XXIII. Copyright, 1888, by TICKNOR & COMPANY, Boston, Mass. No. 635.

FEBRUARY 25, 1888.

Entered at the Post-Office at Boston as second-class matter.

CONTENTS

ONE of the New York papers has recently called attention to the unnecessarily high price of structural iron in this country, describing the well-known combination of manufacturers by which the price is kept up. We will not undertake to criticise the morality of the combination, or to enter upon the general question of the policy of keeping up prices by artificial means, but there is something interesting in the consideration of the effect of the present system upon the art of construction in the United States. The wholesale price of rolled-iron floor-beams is now in this country three and three-tenths cents per pound at the mills, the rate being the same at all the seven mills which furnish such beams. In France and Belgium there has recently been a great advance in the price of this, as of other sorts of structural iron, but the latest quotations give one and nineteen one-hundredths cents per pound for rolled floor-beams as the price at the French mills, while the Belgian manufactories sell even lower, the market quotation for floor-beams in Belgium having been, not long ago, less than nine-tenths of a cent a pound, or little more than one-fourth of the American price. The present English price is one and sixteen one-hundredths cents per pound. Of course, at these rates the foreign beams would be imported if it were not for certain obstacles, of which one of the most serious is a specific duty of one and one-fourth cents per pound, or about one hundred and forty per cent on the Belgian price. The cost of handling, and transporting four thousand miles across the sea, adds nearly as much more, but even with these burdens, the foreign beams are delivered in New York for considerably less than the price of the American ones, and would be extensively used, were it not for the fact that most architects depend, in estimating the strength of floors, upon the tables given in the books which are issued by the American rolling-mills, and write their specifications in accordance with what they find in those books, so that the foreign beams, which differ in section from ours, are likely to be rejected, as not in accordance with the specification, and be thrown back upon the contractor's hands. We had once a case which illustrates this point. The specification required that a certain sidewalk should be laid with twelve-and-one-quarter-inch rolled beams of a certain weight per yard, the weight being that of a familiar American pattern. The contractor, instead of sending to the American mill for beams of exactly the size and weight specified, ordered his beams from Belgium. They arrived, all cut to the proper lengths, but proved to be only twelve inches high, and somewhat lighter than the specification required, so that, as the specification did not provide for any surplus strength, there was nothing to be done but to refuse to accept them, and to order American beams in the place of them at the contractor's expense. In some respects the foreign beams are better than ours, the flanges being usually wider, so as to give a lateral stiffness which is valuable, while various patterns of floor-beams are furnished five or six inches high and very light, so that a man can handle them much more easily than he could a wooden beam of the same length, but the unwillingness of architects to cut off competition by specifying any particular manufacture, together with the difficulty of getting accurate profiles and calculating the moments of inertia of the foreign sections, practically prevents their use by architects, unless for very extensive buildings, where contracts are made on so large a scale that special measures can be taken to secure the greatest economy.

WHAT would be the result of removing the burdens from the importation of structural iron, or the reduction of the price of American beams to the English and Continental standard, may be readily predicted. At present, a floor laid with iron beams is too costly a luxury in this country for any but the very rich; but if such beams could be procured at one cent a pound, they would be very nearly as cheap as wooden joists. In practice, the floor-beams used in Paris are rather lighter, with a given stiffness, than our patterns, but taking as a standard of comparison a Pencoyd four-inch I-beam, weighing eighteen and one-half pounds to the yard, we find that such a beam twenty feet long will carry three thousand two hundred and twenty pounds distributed load, or one hundred and sixty-one pounds to the foot, and will weigh one hundred and twenty-three pounds, and cost, at something more than the Belgian price, a dollar and twenty-three cents. In comparison with this, a three by twelve hard-pine joist of the same length will carry thirty-nine hundred and sixty pounds distributed load, by the most recent data, but it will weigh two hundred and twenty pounds more than the iron beam, leaving the net bearing capacity for comparison thirty-seven hundred and forty pounds. This is seventeen per cent more than the iron beam, but at thirty dollars per thousand feet the wooden joist will cost a dollar and eighty cents, or fifty per cent more than the iron, while, as it will occupy three times the height, and require a correspondingly greater amount of material, in the shape of masonry or iron columns, to secure the same height in the rooms, the cost of using it would be practically more than double that of the iron beam. In districts where spruce is the ordinary framing timber, cheap as this is, there would still be a considerable economy in using iron, while the advantages in point of resistance to fire and decay would be enormous. On the other side of the water the clumsy methods used to attach floors and ceilings to iron beams carry the cost of such a construction beyond that which employs wooden joists; but the art of handling structural iron is much more highly developed here than it is abroad, and if our architects could get metal floor-beams at the foreign rate, they might be depended upon to improve the details of the construction in which they are used so rapidly that in a few years a city building with floors of wooden joists would be a rare exception.

A SOUTHERN correspondent sends us a circular inviting designs in competition for a church in Tennessee. The cost of the structure is not to exceed sixty thousand dollars. Intending competitors are requested to furnish "plans, specifications and estimates," and "the architect whose plans and specifications are accepted will be paid one hundred dollars." Moreover, "gilt-edged bond will be required of the successful competitor for faithful and satisfactory work, and quality of material in all their branches." Just what this last sentence means is not clear, but we suppose that it is to be explained by remembering the confusion which exists in the South between builders and architects. The average Southerner, when he wants a house, goes to the man who deals in houses, namely, the nearest builder, and makes such a bargain as seems to him proper. Perhaps the man of planks has an apprentice who has been to an evening drawing-school, or a talented son just entering upon the study of long division at the Academy, and, to hasten the conclusion of the trade, or, perhaps, to head-off a rival builder, who does not enjoy these advantages, he has the proposed structure "drawed out" for his customer's edification. That there could be any better course than this for securing a suitable design for a church edifice does not seem to have occurred to the good people of this particular Tennessee community. They have a glimmering of an idea that there is such a thing as a beautiful building, in distinction

from an ugly one, and mention that "architectural beauty and finish are sought," although "not at the sacrifice of substantial solidity," and, apparently feeling that it may be an extra expense to the builder to get anything like "architectural beauty and finish" inserted into his drawings, they considerately promise a *douceur* to cover this outlay. We presume that the idea of paying an architect fifteen hundred dollars to "draw out" their church would seem to them preposterous, and we are not sure that they may not be right, considering the sort of appreciation that might be anticipated for a good design.

TWO more distinguished architects have died within a few weeks, M. Questel in France, and Mr. Edward I' Anson, the President of the Royal Institute of British Architects, in England. Mr. I' Anson studied his profession under his father, who was an architect of distinction in the City of London, and the son succeeded to an important practice in the designing of commercial buildings, and in the adjustment of cases relating to City property, with the value of which he was thoroughly familiar. His skill as a surveyor and referee was so remarkable as to win for him the office of President of the Surveyors' Institution in the same year that, in recognition of his attainments in another department of the profession, he was elected President of the Royal Institute of British Architects. Although constantly occupied with work demanding judgment and experience rather than more æsthetic qualities he was a good deal of an artist. He spent much time in travelling and sketching, and his executed works, among the more important of which are the Corn Exchange in Mark Lane, and the Bible Society's house on Queen Victoria street, are worthy of the highest praise. Among other things, he is said to have the credit of being the first man in London to design buildings intended wholly for business offices. It was formerly the rule for merchants to have counting-rooms in their warehouses, and for other business men to hire rooms in private houses; but, on his suggestion, two or three buildings were erected, entirely occupied by small rooms for offices, and these proved so popular that the fashion soon spread. In the death of M. Questel, the profession loses one of its wisest and most honored members. Born in 1807, he had been for two generations a conspicuous figure in French art, not only through his own work, but by his singular success in directing the career of a long list of distinguished pupils. He received his own training under Peyre, Blouet and Duban, and after a three years' residence in Italy was appointed to a modest position on one of the Government buildings in Paris. He rose rapidly, and was Inspecteur des Travaux when he won in competition the important commission for the Church of St. Paul at Nîmes This was followed by the design for the fountain in the Esplanade at Nîmes, with several other important works, and he was about the same time appointed to the Commission for the Preservation of Historical Monuments, preparing in the course of his duties many restorations and measured drawings of the principal Roman buildings on French soil. His connection with the School of Fine Arts was soon resumed, by his succession to the place formerly occupied by his own master, Blouet; and the merit of his pupils, among whom were Daumet, Brune, Pascal, Joyaux, Noguet, Raulin and many other winners of the Prize of Rome, gained him a high reputation as a teacher as well as an artist. Various other important works brought him added honors. In 1871, he was elected a member of the Institute of France, in the Section of Fine Arts, succeeding his master Duban; and in 1884 he was chosen President of the Société Centrale des Architectes Français, the principal French professional body, and, soon after, of the Caisse de Defense Mutuelle des Architectes, then just formed.

THE *Builder* mentions an article by Mr. T. Mellard Reade in the *Geological Magazine*, upon the permanent expansion of terra-cotta by the weather. In the case which he describes, a terra-cotta coping on a garden wall lengthened so much after setting in place as to raise itself in the form of an arch, the middle portion of which was lifted an inch from its bed. Naturally, the coping pieces at the middle and springing points of the arch were broken, and on replacing the broken pieces it was found that since the first setting the coping had expanded about a quarter of an inch in a length of thirty feet. One might suppose that such expansion would be more likely to be due to the swelling of the cement in the joints than to any change in size of the terra-cotta, but careful tests, and comparison of similar cases, convinced Mr. Reade that the cement was not here at fault. The English terra-cotta is softer than ours, and it seems not impossible that it might absorb water enough, when exposed to the weather, to cause some enlargement. We have never heard of any similar occurrence in this country, but if terra-cotta is to be used, as in the new Pension Office at Washington, in bands three or four hundred feet long, it would be a wise precaution to have some careful experiments made.

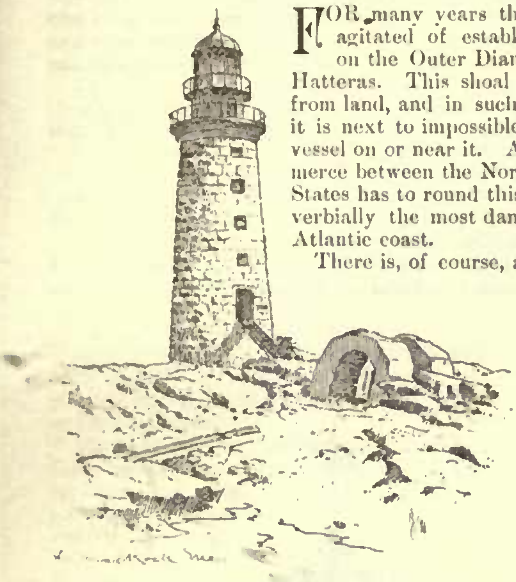
THE *Scientific American* copies from the Vienna insurance journal, *Assecuranz*, an account of the new police regulations in regard to wood-working shops in Berlin, which would rather startle the proprietor of a New York or Chicago planing-mill. By these regulations every wood-working establishment must have its principal walls of brick or stone. If there are rooms over the shop for habitation, the shop ceilings must be plastered, and the plaster covered with corrugated sheet-iron; and the floors of the rooms above must be packed with fireproof filling. The shop doors must be of iron, hung on pintles or in iron frames, and the stairs leading to them must be fireproof. Shavings must be placed in a brick bin, vaulted overhead, and shut off by an iron door. Under no circumstances is a shop to be heated by iron stoves, or to have a metallic smoke-pipe carried through it. Stoves, if used, must be of stone or tiles, so arranged that they can be supplied with fuel only from outside of the work-room; and flues must be built in the walls. Glue must not be warmed in the shop, but every shop must have a glue-heating room, having thick brick walls, a brick vaulted ceiling, and floor of masonry, separated from the shop by an iron door.

AN archæological treasure has recently been discovered at Saïdi, the ancient Sidon, on the coast of Asia Minor, and secured by the Turkish Government. It seems that some workmen, while digging a well in a garden in the town, broke into a chamber, with walls of masonry, in which were some ancient sarcophagi. A telegram was immediately sent to the Director of the Imperial Museum at Constantinople, who arrived at the spot in time to prevent any displacement of the precious objects. On removing the *debris* in which they were buried, seventeen of the sarcophagi were found, of various ages and styles, six being considered to be Greek, six Phœnician, one Egyptian, one Libyan, and three of indeterminate character. Some of them were exquisitely sculptured, one, in particular, having its exposed face divided into eighteen panels, in each of which was a beautiful bas-relief of a weeping girl. On opening the sarcophagi, nothing was found of value except two gold buttons and an ornament for the head, nor any inscription or other indication of the quality of the persons interred in them, so that the Director concluded that they must have been opened and robbed ages ago, probably, in his opinion, by the Crusaders. *La Semaine des Constructeurs*, however, defends the reputation of the Crusaders by remarking that the tombs are much more likely to have been desecrated by the Persians, who captured and destroyed Sidon in B. C. 351, just after the period to which the best of the sarcophagi seem to belong.

LA SEMAINE DES CONSTRUCTEURS publishes first this year the list of theatres burned during 1887. Including circus and concert halls, the list comprehends nineteen structures used for public amusement which were wholly or partially destroyed during the year, with a loss of about four hundred lives. The first fire mentioned is that which consumed the theatre of Göttingen in Prussia on the tenth of January. Six days later the circus of Sidoli at Bucharest was burned, and on the thirteenth of February the Northampton Opera-house in England. Four days after this a theatre was destroyed at Laybach in Austria, and on March 28th the Cirque Herzog at Ghent. The terrible fire at the Paris Opéra Comique occurred May 26th, and in June a theatre and a circus were burned in Russia, a concert-hall at Rotterdam, and the Théâtre Lafayette at Rouen. In July one theatre was burned in the United States, one in Spain and one in Holland. In August the opera-house at Stockport in England, and on the sixth of September the Exeter Theatre. On the fourteenth of September a concert-hall at Calais was destroyed, in November a circus at Hamburg, and in December the Islington Theatre in London. To these eighteen conflagrations *La Semaine* adds the panic at the Dilettanti Theatre in London, caused by a harmless blaze, in which many persons lost their lives, as a disaster which should be classed with the fires.

ANCIENT AND MODERN LIGHT-HOUSES.[1] — XVIII.

CAPE HATTERAS.



FOR many years the subject has been agitated of establishing a light-house on the Outer Diamond Shoal, off Cape Hatteras. This shoal is about eight miles from land, and in such stormy waters that it is next to impossible to maintain a light-vessel on or near it. All the sea-going commerce between the Northern and Southern States has to round this point, and it is proverbially the most dangerous place on the Atlantic coast.

There is, of course, a light on Cape Hatteras, but the shoal is so distant that it is very difficult to estimate its locality. south-bound vessels to avoid the current of the gulf-stream have to pass close to it, and it has the gloomy reputation of causing more wrecks and disasters than any other place in America.

The success with the Rothersand and Fourteen-foot Bank Light-houses in my opinion point the way to obtaining a secure foundation in these shifting sands, and I believe that the solution of the problem consists in building a steel or cast-iron cylinder forty-five feet in diameter, sinking it on the shoal so that its base will be below any possibility of wave-action, filling it with concrete, and protecting it on the exterior by the liberal use of rip-rap in large blocks.

The cylinder should be double, the inner cylinder being fifteen feet in diameter and very strongly braced to the exterior one, the connection between the interior and exterior cylinder at the bottom should be conical in shape, and would answer for the working-chamber if the cylinder were to be sunk by the pneumatic process, though I believe it possible to sink it rapidly by dredging from the interior. The cylinder could be so built as to admit of either plan being used.

At a suitable locality on the Outer Diamond, there is a depth of about twenty feet; the cylinder should be put together at some safe harbor, floated to this point and sunk as quickly as possible. I estimate that when the bottom of the cylinder reaches fifty feet below the surface of the shoal and the rip-rap is placed around it, it will be safe from the scour of the waves.

One of the many difficulties attending this work is that the nearest available harbor is Cape Hatteras Inlet, only fifteen feet deep and fifteen miles away. Should a storm overtake the cylinder while being towed to the site, it would, in all probability, be lost, and the same catastrophe might occur if there were a heavy blow during the first part of the sinking of the cylinder; after it had gone down ten or fifteen feet the danger would be much less, and if the attending vessels were driven away by stress of weather, they might have a reasonable assurance of finding the cylinder in place on their return. The power of the cylinder to resist the waves, before it was filled with concrete, would depend entirely on the strength of the interior bracing, and too much pains could not be expended in making this of the best design, material and workmanship.

With the foundation once secured, it would be of no great difficulty to erect a suitable superstructure.

Should this light-house be successfully established, it will be a remarkable feat of light-house engineering, and be of benefit to more commerce than any one light-house in the world.

Barring accidents, the cost should not exceed $300,000 for the foundation, but it would not be safe to commence work without having at least $500,000 available. The accompanying sketches give a general idea of the plan and elevation of the kind of cylinder proposed.

Congress will be asked this session to appropriate the necessary funds for this important work. Should the appropriation be made, the foundation could be built and placed, barring accidents, in less than two years.

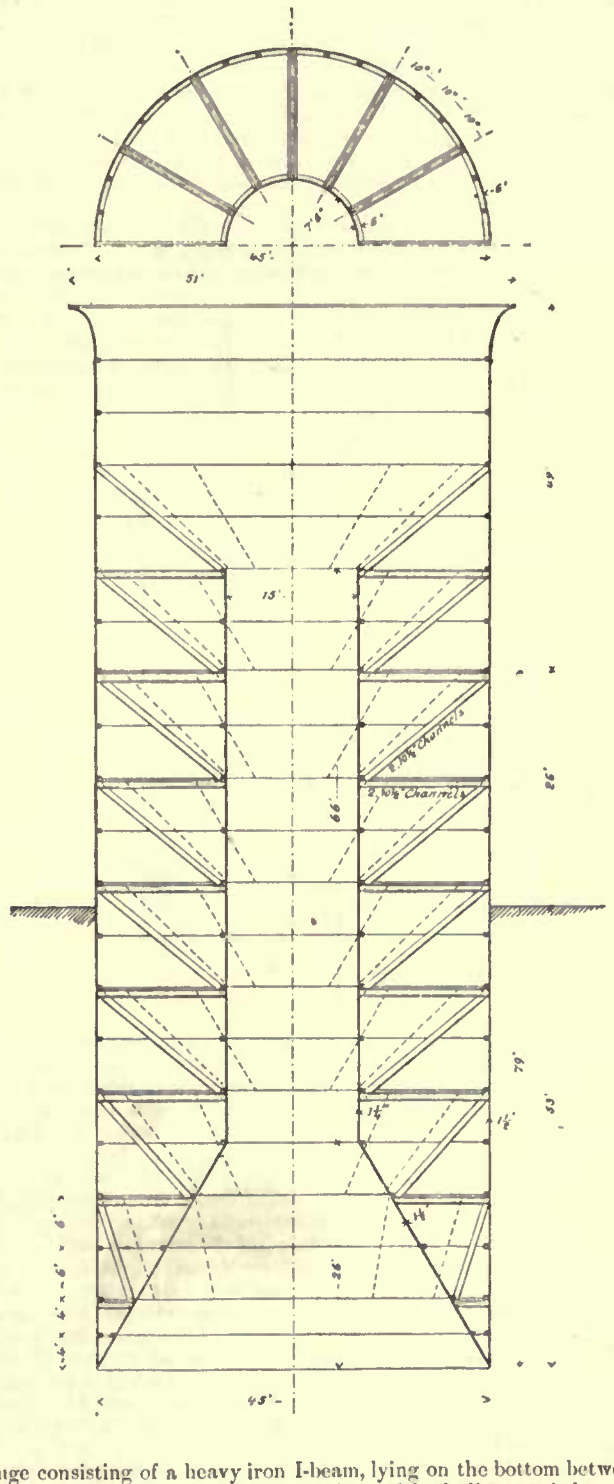
SKELETON IRON LIGHT-HOUSES.

Another type is the skeleton iron light-house: this is especially adapted to sites where it is desired to erect a lofty structure without too much weight; it may rest on iron-piles, screw-piles, grillage or other foundation, depending on whether the light-house stands in the water or on land, and whether the site is rock, stiff clay, sand, earth or mud.

The finest two light-houses of this kind, which rest on iron-piles driven in coral rock, are those erected on Fowey Rocks and American Shoals, Florida. They are duplicates of each other, the first one built being the one at Fowey Rocks on the east coast of Florida, at the northern extremity of Florida Reefs.

Examinations to test the character of this reef were made in 1875; the engineer reported: "It was with the greatest difficulty and delay that a sailing vessel could reach the spot in weather sufficiently calm to do any work. The rock composing the reef is harder than that farther south and west, and it is believed will furnish a secure foundation for the kind of structure decided upon." During the same year the designs for the light-house were well advanced, and preliminary works connected with the erection of the light-house were begun. These consisted in building at Soldier Key, four-and-one-half miles distant from the reef, a substantial wharf with track, store-house and quarters: all these buildings had to be raised six feet above the surface and strongly secured, as during hurricanes the sea sweeps entirely over the surface of the Key. At the site the working platform was completed, and contract was made for the delivery of the ironwork for the foundation and first stories of the light-house, which was delivered at Soldier Key in the spring of 1867, and during the same year all the foundation-piles were driven as follows:

The disc for the central foundation-pile was first lowered to its place, and through this disc the first iron-pile was driven. One of the perimeter discs was then placed in position and located by a



gauge consisting of a heavy iron I-beam, lying on the bottom between and in immediate contact with the edges of both discs, and then the first perimeter-pile was driven through the centre of this disc. The greatest precaution had to be taken to drive these piles vertically; hence, after each blow of the hammer the pile was tested with a plummet, and the slightest deviation from the vertical was rectified

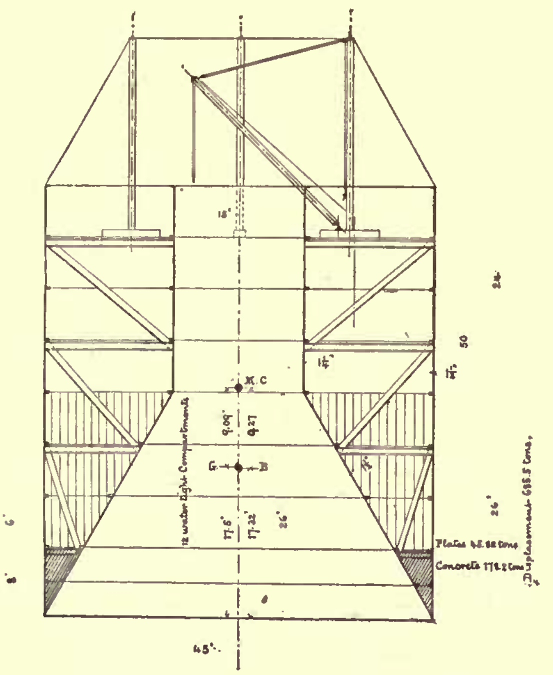
[1] Continued from page 312, No. 627.

by tackles, used as guides, fastened to the top of the pile. Each iron-pile was driven about ten feet into the rock. In locating the disc for the next perimeter-pile, two gauges were necessary, one to obtain the proper distance from the central pile, the other to maintain the proper distance from the perimeter-pile just driven; and these two gauges were alike except in length. The discs were dragged along the bottom until their outer edges just touched the free edges of the gauges. Each pile was then driven through the centre of its disc. After all of them were driven, their tops were levelled by cutting off each to the line of the lowest. The piles were then capped with their respective sockets; the horizontal girders were inserted, the diagonal tension-rods were placed and screwed up, and the foundation series was completed. This work, including the building of the temporary platform occupied just two months, during which time the sea was quite smooth.

Owing to various delays in the manufacture of the superstructure it did not arrive at Soldier Key until November 12, 1877. The weather preceding its arrival and for three months after was unfavorable for its erection. Gale followed gale, and though a large force of workmen was at Soldier Key ready to work when weather permitted, nothing could be done. For six weeks there was but one day on which a landing could be effected at the light-house site. This day was utilized by laying a decking of four-inch plank on the wooden platform. Finding the weather still unfavorable, with no immediate prospect of getting to the site, and all the shore-work completed, it was decided on December 13, 1877, to temporarily suspend operation.

On February 24, 1878, the weather appearing more favorable for reef-operation, work was resumed; the party arrived at the site on the 25th February, and encountered a tornado which considerably damaged the vessels.

One of the lighters, a small schooner, capable of carrying twenty-five to thirty tons of freight on four feet draught of water, was loaded with the portable hoisting-engine, derrick, tackles, shear-poles and a



small quantity of iron. The sea continued so rough that this load could not be landed until March 12, when a landing was effected through the breakers by means of small boats, and the derrick and shears erected on the platform. During the next sixteen days five more cargoes of iron were landed, and the first series of columns, girders, sockets and tension-rods placed in position.

It became evident from the slow progress thus far made, owing to stormy weather and the danger attending frequent landings through the breakers, that, unless a lodgement could be effected on the platform and the men be made to live thereon, the structure could not be completed within a year. Therefore, on March 29, the lighter was loaded with one month's supply of provisions, water, etc., towed to the platform and its freight landed; two large tents were set up on the platform, a temporary kitchen built, and twenty men left to continue the erection of the light-house. The advantages of this arrangement were very great. No matter how high the sea might be running, the men were there out of water, on a safe and steady foundation, and they could continue the work so long as they could be kept supplied with material.

The remainder of the force was employed in loading the lighter and steamer, and when the weather was favorable, in unloading the lighter at the platform. On days that were too rough to unload the lighter, all hands would land at the site in small boats, if a landing was practicable, and assist in erection. By keeping the lighter loaded and steam on the tender day and night, no available time was lost.

On June 15, 1878, the tower was completed and the light was exhibited.

The cost of this light-house was about $175,000.

Another advantage of this type of light-house is the quickness with which it can be erected. At American Shoals the ironwork was completed at the North, shipped to Key West, Florida, and the light-house completely erected and lighted in one year.

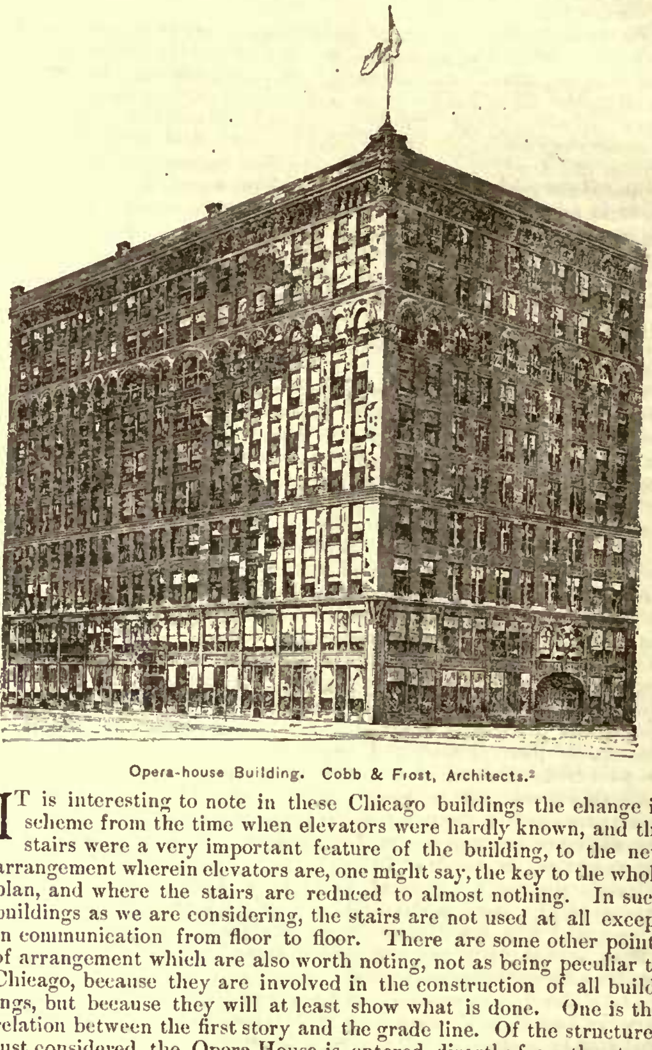
Both Fowey Rocks and American Shoals Light-houses are first-order lights, one hundred and fifteen and one-half feet high, and visible sixteen and one-fourth nautical miles.

There are several other light-houses of this type on the Florida Reefs, such as Carysfort Reef, Alligator Reef, Sombrero Key and Sand Key, all first-order lights, from one hundred and ten to one hundred and forty-four feet high.

Florida is rich in first-order lights; she has twelve in all, as many as Maine, Massachusetts, Rhode Island, Connecticut and New York combined.

NOTES OF TRAVEL.

CHICAGO.—III.[1]



Opera-house Building. Cobb & Frost, Architects.[2]

IT is interesting to note in these Chicago buildings the change in scheme from the time when elevators were hardly known, and the stairs were a very important feature of the building, to the new arrangement wherein elevators are, one might say, the key to the whole plan, and where the stairs are reduced to almost nothing. In such buildings as we are considering, the stairs are not used at all except in communication from floor to floor. There are some other points of arrangement which are also worth noting, not as being peculiar to Chicago, because they are involved in the construction of all buildings, but because they will at least show what is done. One is the relation between the first story and the grade line. Of the structures just considered, the Opera-House is entered directly from the street with but a single step. In the Munroe Street Building, and the Montauk Block, the first story is raised a few steps above grade and the basement is sunk a few more, so that the basement has high windows, but is below the grade. In the Home, the Pullman Building and the Rookery Buildings the basement is on a level with the street. Where practice differs so widely it is hard to say which is the best arrangement. It is a question that comes up with every new office-building that the architect has to deal with, and where owners and real-estate dealers differ so widely, it is not strange that architects should sometimes recommend one method and sometimes another, even under the same circumstances, but it seems as if the plans adopted in the Opera-House, the Rookery and the Home Buildings were, on the whole, the most satisfactory, and especially so in Chicago, where the nature of the soil will not admit of a deep cellar that can be of any practical value. Besides, we are inclined to think, judging from appearances, at least, that a building with a flush basement and first story entirely raised above the ground rents better and gives more satisfaction than one in which the basement is partly below grade.

Another question which is solved in many different ways is the height of stories. Without going into the consideration of all these

[1] Continued from page 315, No. 627.
[2] The author is indebted to the Editors of the *Inland Architect* for permission to reproduce this and the following cuts.

buildings, we will simply state that in the Rookery Building, the latest of its kind, the heights are eleven and twelve feet for the office stories.[1] In the Home and the Opera-House Buildings we believe the stories are somewhat less than this. The changes in arrangements of these buildings have been no more radical than the changes in the construction.

In a subsequent paper we will consider some of the problems involved in the foundations of these office-buildings. The construction of the superstructure is a chapter by itself, and we fancy an investigation of the methods in use in Chicago would be a revelation to every thinking man in the country. The old constructions of the period before the fire were slip-shod, flimsy, and in every way defective. Now, there can hardly be found better constructions, on the whole, than those of some of the Chicago architects. Their buildings are scientific in the manner in which the weights are distributed and the loads calculated, and are economical of space, money and light. Indeed, we are almost inclined to think that at present the most praiseworthy side of the Chicago architecture is its construction. Certainly there have been problems solved there that are never met with elsewhere, and what is more, they have been worked out in a manner that shows the most careful study and thorough appreciation of the conditions.

We have thus far considered the office-buildings only in relation to their construction and arrangement. It goes without saying that the buildings are grand and imposing. No structure can be erected covering the area that these do, and carried up into the air ten or twelve stories, without being majestic and awe-inspiring. We well remember our sensations on emerging from the Rock Island Railway Station one frosty morning. The sun had not yet penetrated the depths of the cavernous streets, and, walking up the avenue towards the Grand Pacific, with the huge buildings to the right and left and the great hotel looming up ahead, with its numerous chimneys and gables, the first turn bringing us face to face with the enormous Russian-like tower of the Exchange, the effect was overpowering, and completely annihilated criticism. Such structures seemed more than human, especially under the dim veil of the morning light, which revealed only their immense forms and shrouded their defects of detail.

One such building is imposing, but a whole street of such huge structures seems like the work of giants, and is too much to be comprehended in a day. The effect is hardly less stirring coming up La Salle Street from Monroe, with the huge blocks of the Rookery and the Home Buildings on the left, the Insurance Exchange, Maller's Building and others on the right, and the great tower of the Board of Trade looming right across the street at the end. It forms a picture such as can be found nowhere else in the world, and one feels very small indeed when undertaking to grasp the whole of such structures and weigh them and consider them in the mind. It is only after coming back to them day after day that one begins to appreciate them, to see how they are put together and how they are formed, and also to understand that these great creations had their beginnings in much smaller ways and on much lesser scales; that they are no less the results of growth than the more humble buildings, in size at least, of our own Boston. Mushrooms we might call them, considering their number and the rapidity with which they have been evolved. But there is nothing "Western" about these buildings; they were built to endure, just as emphatically as any of the structures which grace our Eastern cities or the capitals of Europe, and whatever one may say of their architectural excellence, no one can deny their impressive value.

Before the fire the German elements in design prevailed in Chicago much the same as they did in New York and do still for that matter, and a pseudo-Classic front, with panelled pilasters, string-courses at each story, and with arched, bowed and lintelled windows, was considered the correct thing. For many years the finest building in Chicago was assumed to be a structure called Booksellers' Row, an undefinable mixture of incoherent Classic and badly-mangled Gothic, neither pleasing in general effect nor tolerable in detail, but largely implying a feeling in style which one would characterize by the hateful adjective "Western" as applied to art. To the credit of Chicago the day of such buildings is entirely passed, though there are people so benighted as still to consider Booksellers' Row as one of the ornaments of the city.

All the older buildings were not so bad as this, however. Occasionally, some very successful designs were executed, successful, at least, in the mass, and now and then evincing a mastery of detail and choice of arrangement which give warning of better things to come. There are a number of old dwellings in Chicago, with wide, over-hanging cornices, too simple to be bad in detail and too straightforward to be awkward in expression. Unfortunately, such buildings are rare, and the new movement in art which has been manifested in the more recent buildings has almost taken the form of a protest against these old shams; against galvanized-iron, sanded to look like stone; against thin veneering to take the place of solid masonry; against the feeling that bad stonework was better than good brick, and against the general lack of artistic expression. The forerunner of the new work was a building, the name of which we do not recall, on the south-east corner of Washington and Dearborn Streets, designed by W. L. B. Jenney. This structure is built almost entirely of brick and terra-cotta, and was a revelation to a great many of the Chicago architects. Mr. Jenney, we believe, had studied at Paris and came to Chicago as a comparatively new man when he erected this structure. In the light of subsequent achievements, it might be criticised as somewhat boxy in treatment and unnecessarily emphatic in structural manifestations, but on the whole, it was a very successful building, especially so for the time when it was erected, and is still one of the good, first-class office-buildings of Chicago.

It is interesting to compare this building with the latest work of Mr. Jenney, the Home Insurance Building, the plan of which we have previously considered. Externally it is a ten-story structure, simple and straightforward in its character, built almost entirely of brick, with the ornament used very sparingly, but, on the whole, well and in a judicious manner. The style of the building is Classic, but not pronounced in detail, with each story marked by string-courses, and a bold cornice crowning the whole, the pilasters running up between the windows and being continued to the top. The chief charm of the building is in the interior, which is certainly the most successful of its kind in the city. The vestibule on the La Salle Street front extends through two stories and is finished in polished white marble, with the columns supporting the wall and the stair-work, including rails, the posts and the elevator-screens, all in dark bronze. The vaulted roof of the vestibule is of marble slabs, supported on bronze ribs. The elevator-screens are very light and graceful in structure, and being arranged as they are, directly opposite the entrance, with the broad stairs winding up from the first story, and the passage underneath leading directly through into the basement-corridor, the effect is exceedingly pleasing. The entrance-portal is carried up with a broad round arch, the top of which is filled with an elaborately-wrought grille of iron, very light and graceful in its character and forming a perfect picture in combination with the dark bronze and the white marble of the vestibule. Mr. Jenney has shown great taste in the treatment of the interior of the building throughout. The walls of the corridors are tinted a pale salmon. The dados and floors are of white marble and the ceiling is a pale buff. The woodwork, which is confined almost entirely to doors and architraves, is of pale oak, and the elevator-fittings and stair-rails throughout are bronze. It seems like an expensive building, but when we consider how charming the combinations of marble and bronze and tinted plaster are, it would seem worth while to pay more to be in such a building than to have to put up with the blank walls and dreary corridors of even so good a building as the Opera House.

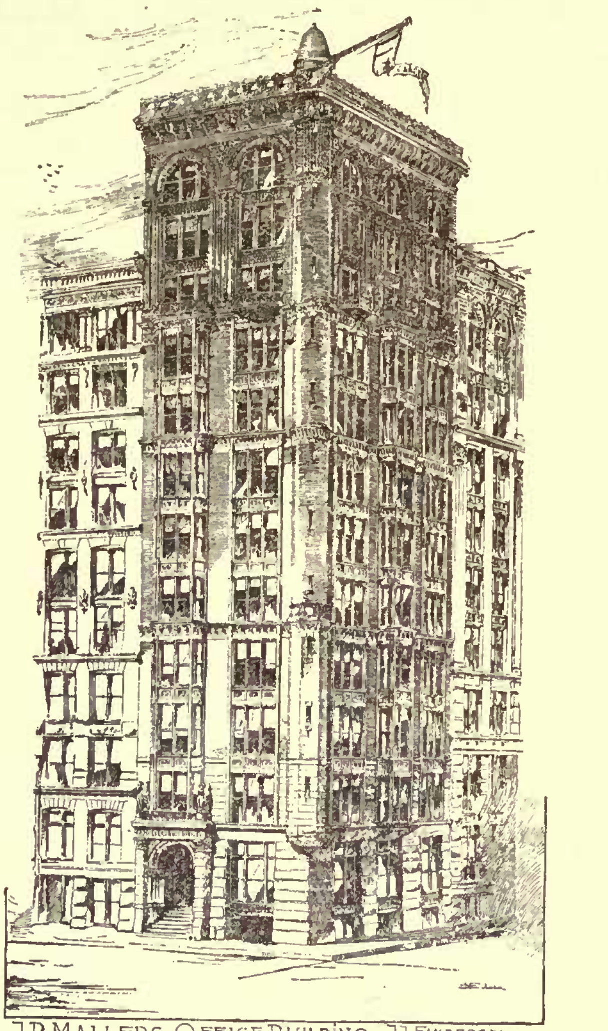
Diagonally opposite from the Home Insurance Building is the structure known as the Insurance Exchange, a sketch of which we publish herewith. This building was erected by Burnham & Root, and as an example of pure brickwork, it is one of the best in the city, if not in the country. We certainly know of none other where simple red brick has been used with such a breadth of treatment both in the mass and detail, helped out only by such terra-cotta as is needed for sills and lintels. It is kept quite plain, the only ornamentation in foliage or carved-work being about the entrance. Everything is dark cherry-red, except the relatively low basement of granite. In the Home Building there is no perceptible attempt at grouping the stories in height, but in the Insurance Exchange a very successful endeavor is manifest to diminish the extreme height of the building by grouping the stories together. The basement is of stone. The first story has simple round arches and plain piers; the two stories above are treated as one, the piers being carried up through, with panelled backs between the stories. Then follows a single story, and above that are four stories grouped across the front in three divisions, and finally, the upper story is treated by itself, and a simple projecting cornice and parapet crowns the whole. The corners are very emphatically marked by wide piers, a scheme which we should fancy would meet with sharp opposition from real-estate agents, but which somehow, seems to be very often adopted in Chicago buildings. Nothing can give so much character and dignity to a building as such treatment. The lack in most office-buildings is in wall-spaces. Of course, it is impossible to have much of this where so much light is required, but by massing the wall-spaces in four broad piers, as has been done in the Insurance Exchange, a very pleasing effect is obtained without any real sacrifice of light to the interior. The corners of the buildings are further marked by bold turrets, which recall the work on the apsis of the Albi Cathedral, and are very satisfactory in effect. A very clever device is adopted in the spandrels above the eighth-story windows and on the walls of the attic. The brickwork is laid with very strongly marked horizontal lines formed by projecting every alterate course of brick, so that the effect is to give an appearance of a different texture to the wall, though the material is, of course, the same. As the height is so great above the ground, one cannot see the coarseness of the device, and the result is only a pleasing appearance, similar to that of the rough-surface paper on which artists so delight in making water-colors. This gives a very decided character to the building, and by carrying these lines up to the arches above the eighth and ninth stories, the circular-topped motives are brought out and made to show for all they are worth. The whole design is admirably balanced, and the effect of color is quite pleasing, though one is tempted to question whether the building would not have been far brighter and pleasanter if the sashes had been painted white instead of black. The problem is thoroughly handled, and the scale of the building carefully preserved. It is large and high but not feeble, and solid and substantial without being clumsy. The interior of

[1] The exact heights from top to top of the stories, beginning with the cellar, are 8′ 8″, 11′ 8″, 17′ 6″, 12′ 6″, 14′ 4½″, 12′ 6″, 12′ 6″, 13′ 9″, 12′ 6″, 17′ 6″, 19′ 6″.

this building is not at all good. It is dark, with some very bad scagliola in the vestibule, quite in contrast to its neighbor the Home Building.

The Opera House-Building is an exceedingly practical building; in fact, it is nothing but a big box, pierced with square holes. It is said to be very well built, and is certainly very satisfactory in arrangement, but one cannot but wish it were treated in a more artistic manner.

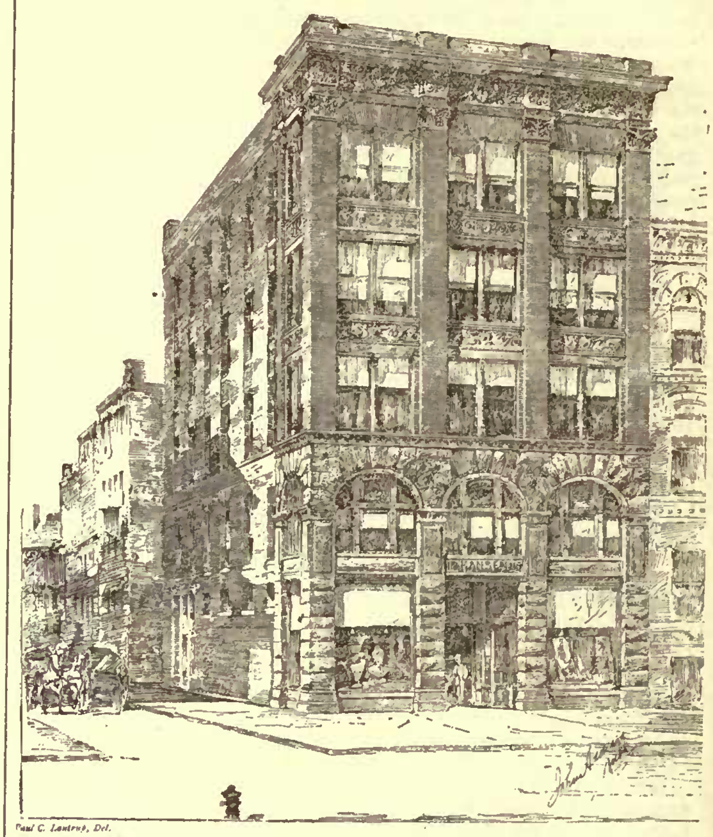
Burnham & Root, who are among the most progressive architects in the city, have twice attempted a feature of exterior design which is certainly interesting, though it can hardly be said to be successful. In the Rialto Building, as well as in a small structure opposite it on Pacific Avenue, the exterior walls are built with a pronounced batter or are diminished by external offsets, becoming visibly thinner and lighter as they ascend. This is, of course, a mere trick, and is by no means an essential element of character in design. A building to be



J.B.MALLERS·OFFICE·BUILDING· J.J.FLANDERS·Arch.

truthful in character need not show all it has, nor exhibit every detail of its construction, and although in these two buildings the architects have made a great deal of the scheme attempted, the result does not seem to justify the means. The greatest wonder in our mind is how Burnham & Root ever persuaded a client to sacrifice the amount of office-room implied by such a device.

The Rookery Building is, all things considered, the most satisfactory of the Chicago office-buildings. A great deal can be said against it, but there is so much that is good in detail, that it easily holds its place as the best designed structure of its kind. It is built entirely of brick, a favorite material with the Chicago builders, but, unfortunately (we say "unfortunately" advisedly) the brick is a dark chocolate color. Had the same forms been followed in the strong cherry tones of the Insurance Exchange, which is directly opposite the Rookery, we believe the results would have been much more pleasing. The lower story of the Rookery is built of very dark granite, with heavy piers alternating with polished shafts of dark, speckled granite or marble. All above the first story is of brick and terra-cotta. The grouping is, first, two stories together; then a wide string-course; then three stories with round arches at the top; then three more stories with similar arches. Above this is a wide corbelled band, and an attic story with square openings. In detail, the work recalls the Spanish-Moorish brickwork, though a considerable Romanesque feeling is introduced into the style. The piers are rounded throughout, the corners of the building are rounded; the archivolts are rounded, and the round-arch feeling predominates in the whole design; but in the diaper-work and in the details, in the outlines, in the turrets which mark the corners, no less than in the wide projected bays over the entrance is there a strong Moorish feeling. The detail is coarse, rather too coarse, it seems to us, but perhaps not so when we consider its relations to the whole enormous bulk of the building. Delicate detail would be impossible in such relations, and although the crudity of some of the work grates on one at first, it may be questioned whether it is not, after all, in keeping with the rest of the building. Certainly, the design is handled in a masterly way in spite of the enormous size to be treated. The entrances are well wrought out, with good lines and just enough emphasis to make them central features, without unduly pronouncing their independence from the rest of the design. If the same design were carried out in stone, it would be overpowering. In brick even, it is massive, ponderous and imposing, in spite of petty details and sharp, crude carving. It is a design which grows on one, immensely, and has the advantage of showing up well at all points. One would wish the lintels over the lower bays were more massive, and more depth would, perhaps, be better for the arches above. The building looks somewhat as if it needed more height, and had been intended to be higher, but had been crowded down, and the arches rather squeezed in between the stories. It is always a difficult problem to work in round arches of such span as is necessitated in a building of this kind, especially when the height of stories is kept so nearly the same throughout, and the arch is obliged to cut into the windows; and the



Paul C. Lautrup, Del.

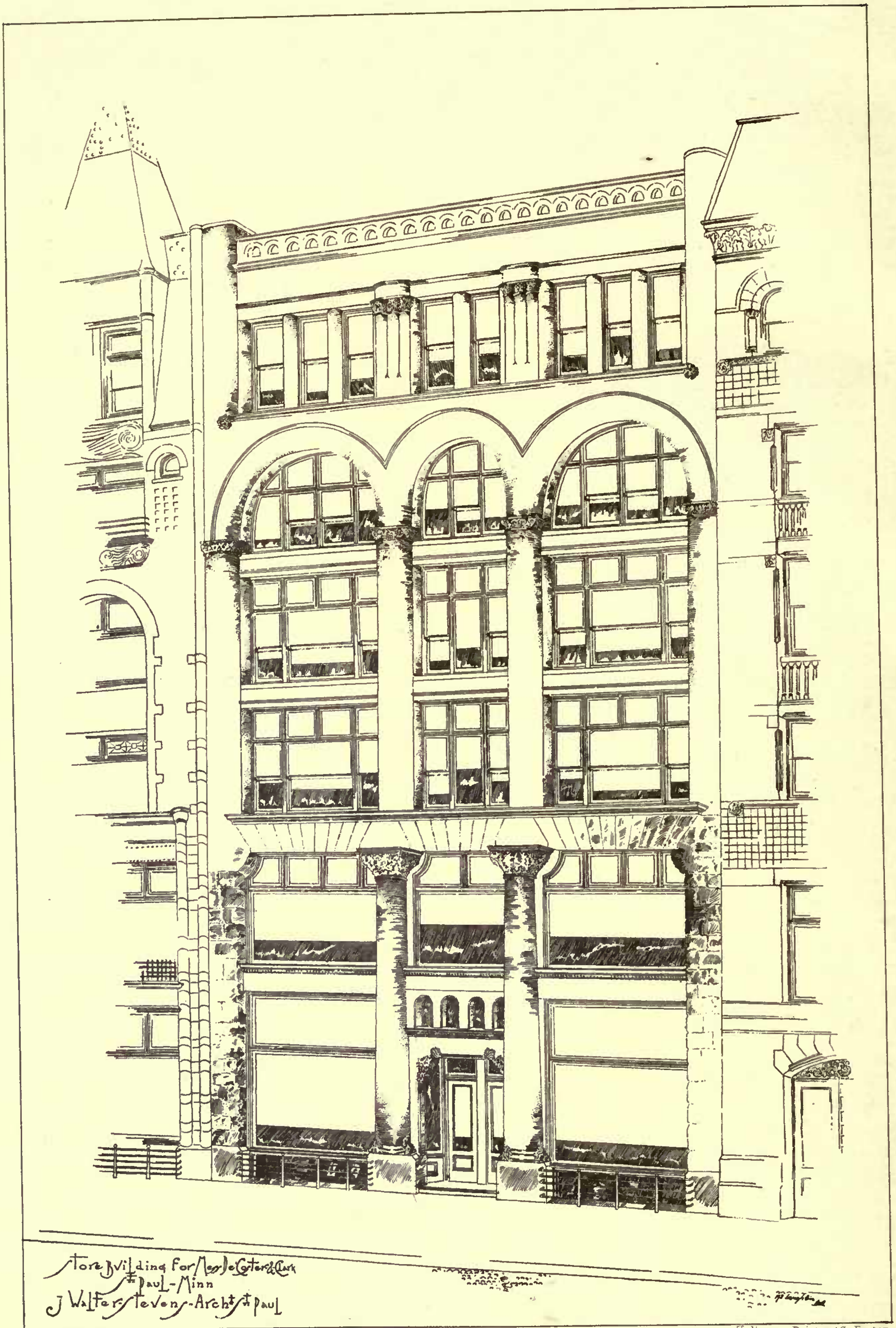
OFFICE BUILDING FOR L. P. HANSEN—JOHN ADDISON, Architect, Chicago.

effect, especially in the sixth story arches is as if there were not quite breathing-room enough, as if the arches had settled down and should have been broader and wider in their spring.

All the buildings are not so successful as the Rookery, either in mass or detail. We present with this, two buildings, the Maller Building, remarkable for its extreme height of thirteen stories on the street, which is rendered even more pronounced by the multiplicity of vertical lines and the long bay on the corner. Also the building for L. P. Hansen on Dearborn Street, by Mr. Addison, a very clever bit of work in a style which apparently has not found much favor with the more recent office-builders, a semi-colonial or classic style.

All the foregoing buildings are the work of Chicago architects. In marked contrast to these is the recently erected building for Marshall Field & Company, from the design of H. H. Richardson, a simple, quiet, unassuming structure, looking like a little Quaker in its simplicity, being contrasted with the gorgeous, overpowering buildings all around it, but none the less pleasing and satisfactory for itself. Then there is the Board of Trade Building, a more or less satisfactory structure of which there has been very unfavorable comment at times, but which has a great deal of grandeur in effect; and, besides, there are very numerous office-buildings scattered all over the city, the mere enumeration of which would take up more space than is at our disposal. The buildings we have considered, however, will serve to illustrate the present condition of the work in Chicago. It is but fair to say that there has been, as yet, no real style developed. Each building is a law unto itself, and no architect

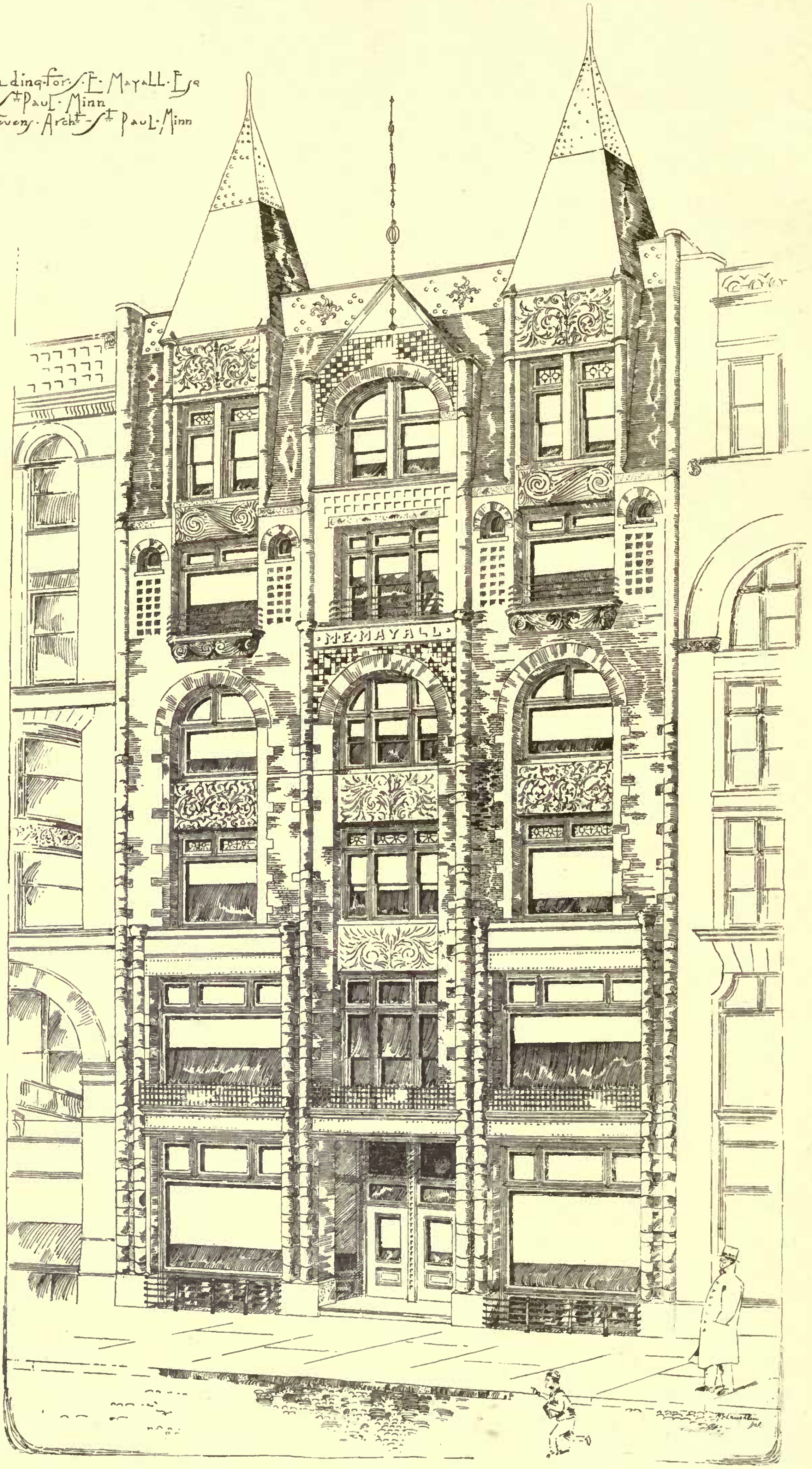
COPYRIGHT 1888 BY TICKNOR & CO



Heliotype Printing Co. Boston

COPYRIGHT 1888 BY TICKNOR & CO

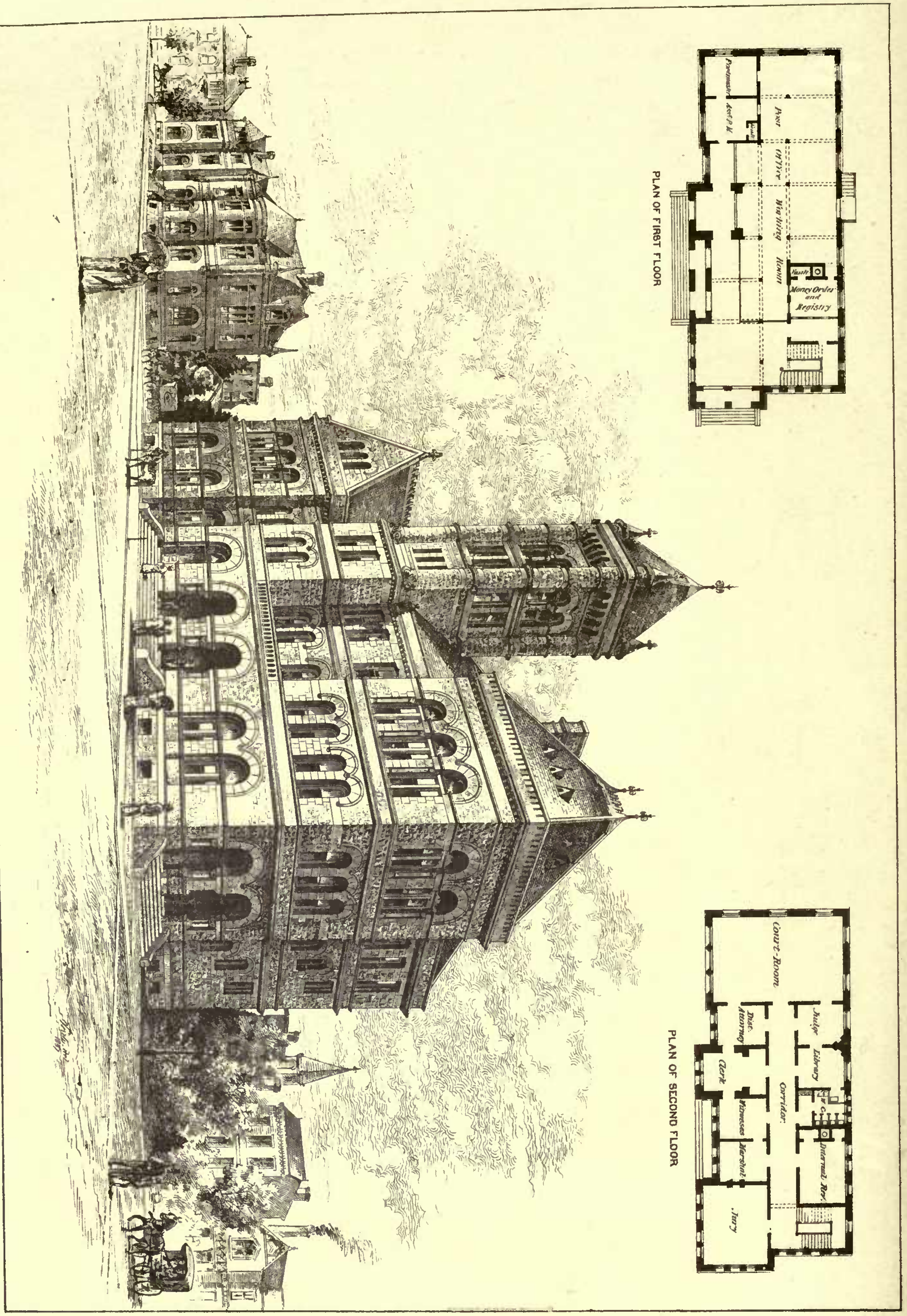
Store·Building·for·S·E·Mayall·Esq
St Paul·Minn
J·Walter·Stevens·Archt·St Paul·Minn



Heliotype Printing Co. Boston.

COPYRIGHT 1888 BY TICKNOR & Co

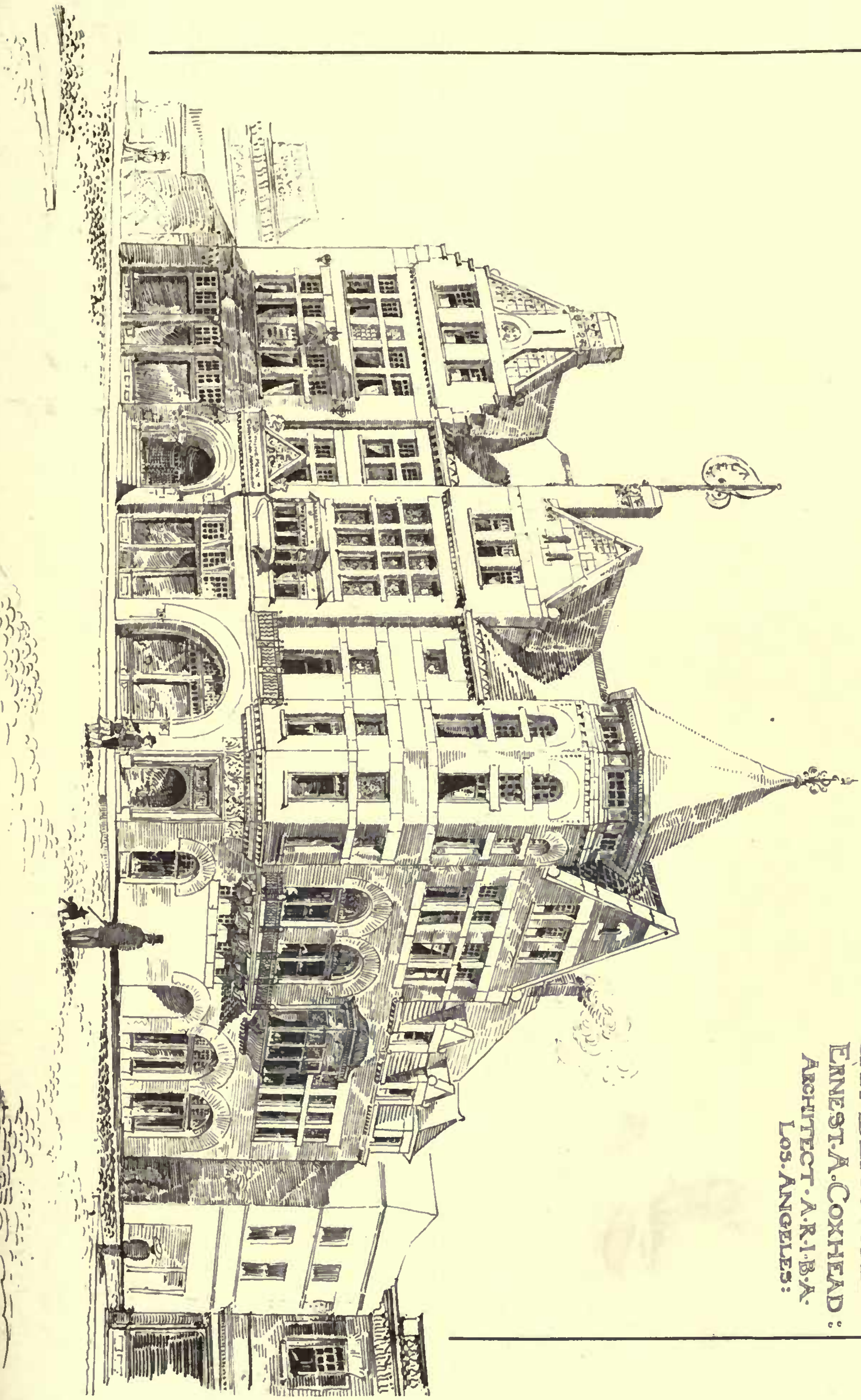
Heliotype Printing Co. Boston.



U. S. Court House, Post Office &c.
WILLIAMSPORT, PA.

W. A. FRERET
Supervising Architect.

COPYRIGHT 1888 BY TICKNOR & CO

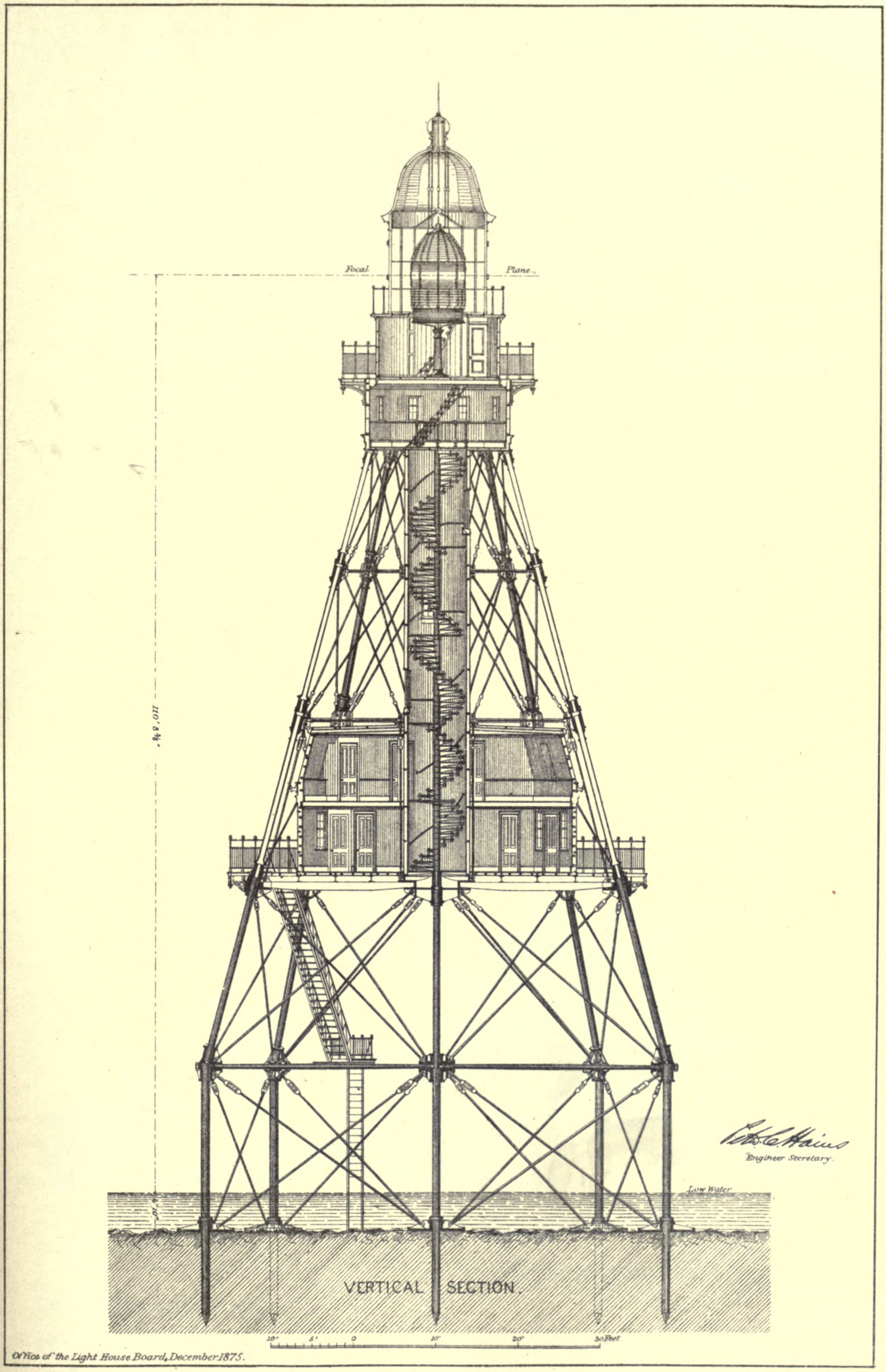


Y.M.C.A. BUILDING:
SAN. DEIGO. CAL:
ERNEST. A. COXHEAD:
ARCHITECT. A.R.I.B.A.
LOS. ANGELES:

Heliotype Printing Co. Boston.

AMERICAN ARCHITECT AND BUILDING NEWS, FEB. 25 1888. No. 635.

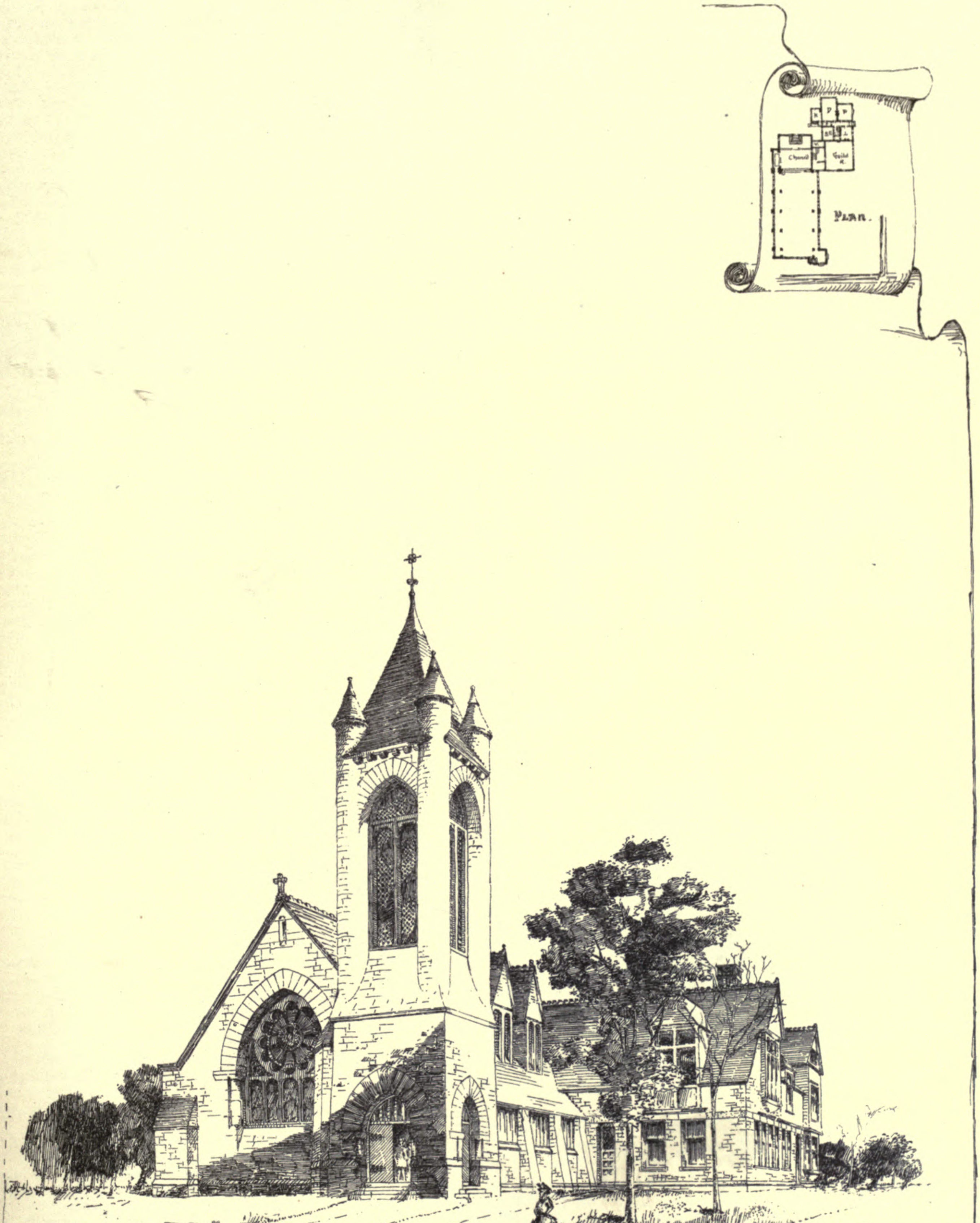
COPYRIGHT 1888 BY TICKNOR & Co



Heliotype Printing Co. Boston.

FIRST ORDER L. H. ON FOWEY ROCKS, FLA.

COPYRIGHT 1888 BY TICKNOR & CO.



CHRIST CHURCH · HERKIMER · N.Y.

R. W. GIBSON
ARCHITECT
ALBANY N.Y.

Heliotype Printing Co. Boston.

seems to feel called upon to follow even his own precedent, either in the choice of design or the character of the detail. There seems to be, throughout, a restless striving after originalty; a seeking for striking effects, which, while interesting, is not always good, and generally serves to belittle the character of the architecture. But the mass of these buildings is generally good. The problems attacked have been met openly; there has been no dodging, no avoiding of necessities, no striving to work-in blind stories or false pediments, and the ideas adopted have been worked out to final conclusions as far as was consistent with the circumstances; so that with all these buildings there is evidence of mental activity. The chief faults lie in the details. The ideas are good, but the Chicago architects will pardon the suggestion that the designs sometimes seem to call for more careful study; that there is a lack, possibly intentionally, of delicacy in the treatment. The designs are handled with too free a hand. Still, with all the life and vigor and thought which has been manifested, one cannot wonder at the crudity of some of the ideas, and the coarseness of some of the details. It is far better to be bold, even to brutality in treatment, than to be refined to weakness. There is always hope from such vigorous, architectural life as is here displayed, and these noble buildings demonstrate Chicago's claim to an honorable position in the national art-life.

C. H. BLACKALL.

THE ILLUSTRATIONS

[*Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.*]

WESTMINSTER PALACE. AFTER AN ETCHING BY FELIX BUHOT.

[Gelatine Print issued only with Gelatine and Imperial editions.]

THE imposing river front of Sir Charles Barry's greatest work has been etched by other hands beside those of M. Buhot. His print ranks in size (our copy is about six inches shorter than the original) between Whistler's small plate of "Westminster Bridge" and Mr. David Law's large etching of the Houses of Parliament. While not equal in the highest artistic qualities to the former, it is a strong, assured and effective piece and much nearer allied to the work of Whistler than of Law. In this, as in others of his etchings, Buhot has surrounded the central picture with a margin of fanciful sketches which on a little careful inspection are seen to bear a sympathetic relation to the subject. Among them we recognize the Westminster Column; the statue of Lord Beaconsfield in Parliament Square; and various "bits" relating to the state, the city and the church. There are the arms of England and the Speaker's mace; the Lord Mayor's coach and state barge, with two or three London sparrows; and a kneeling female figure which suggests Elizabeth Woodville, Queen of Edward IV, taking refuge in the Abbey Sanctuary.

Buhot was born some forty years ago at Valognes in Normandy, a quaint old town once both wealthy and busy, attributes which it has long since lost. He studied under two teachers of the first rank, both more renowned for their pupils than for their own works — first, Lecocq de Boisbaudran, the master of Lhermitte, of Fantin-Latour, of Legros, and of Guillaume Regamey; second, Gaucherel, who taught such etchers as Rajon, Courtry and Lalauze. He has never sought for his work any official endorsement which we believe in his case has been limited to a third-class medal, received in 1880. He is independent and modest, which together with the fact that his work requires some study before it can be fully appreciated, has probably prevented his name and productions from being as widely known as they should be. For it is still true that the most popular art is the shallowest. Buhot served through the Franco-Prussian War under General Chanzy, and afterwards taught drawing at Paris in the College Rollin, until having introduced some innovation in teaching not approved by the governing professors he abandoned this and relied only on his own work for support.

M. Philippe Burty in a recent article, speaks of some plates which Buhot etched from Japanese objects in his [Burty's] collection and compares them favorably with the work of Jules Jacquemart, whom Hamerton has called "the most marvellous etcher of still life who ever existed in the world." Buhot has also etched, from his own designs, illustrations for several of the novels of M. Barbey d' Aurevilly, one or two portraits, some cups and vases made by the goldsmiths Froment-Meurice and Christophle and reproduced several pictures by other artists. But the great bulk of his work is from Nature — studies of donkeys or geese, scenes of Parisian street-life, landscapes in his native Normandy and some English subjects — on the Thames and at Folkestore or at Hastings. His etchings are powerful and expressive and show a keen eye for beauty in Nature and character in people. He uses all the resources of the etcher in his plates and makes many changes, the last states generally being an improvement on the first. He controls all his plates and is an enthusiast on the subject of paper, printing and proofs. Those he thinks the best he stamps with his device — an owl between the initials F. and B., in red. The proof from which our reproduction is taken bears this device, with Buhot's signature. An exhibition of etchings and drawings by this painter-etcher is now open at the gallery of Messrs. F. Keppel & Co., of New York, to whose kindness we are indebted for permission to reproduce the "Westminster Palace."

FOWEY ROCK LIGHT-HOUSE.

FOR description see article on "Ancient and Modern Light-houses" elsewhere in this issue.

THE UNITED STATES COURT-HOUSE AND POST-OFFICE, WILLIAMSPORT, PA. MR. W. A. FRERET, SUPERVISING ARCHITECT, WASHINGTON, D. C.

Y. M. C. A. BUILDING, SAN DIEGO, CAL. MR. ERNEST A. COXHEAD, ARCHITECT, LOS ANGELES, CAL.

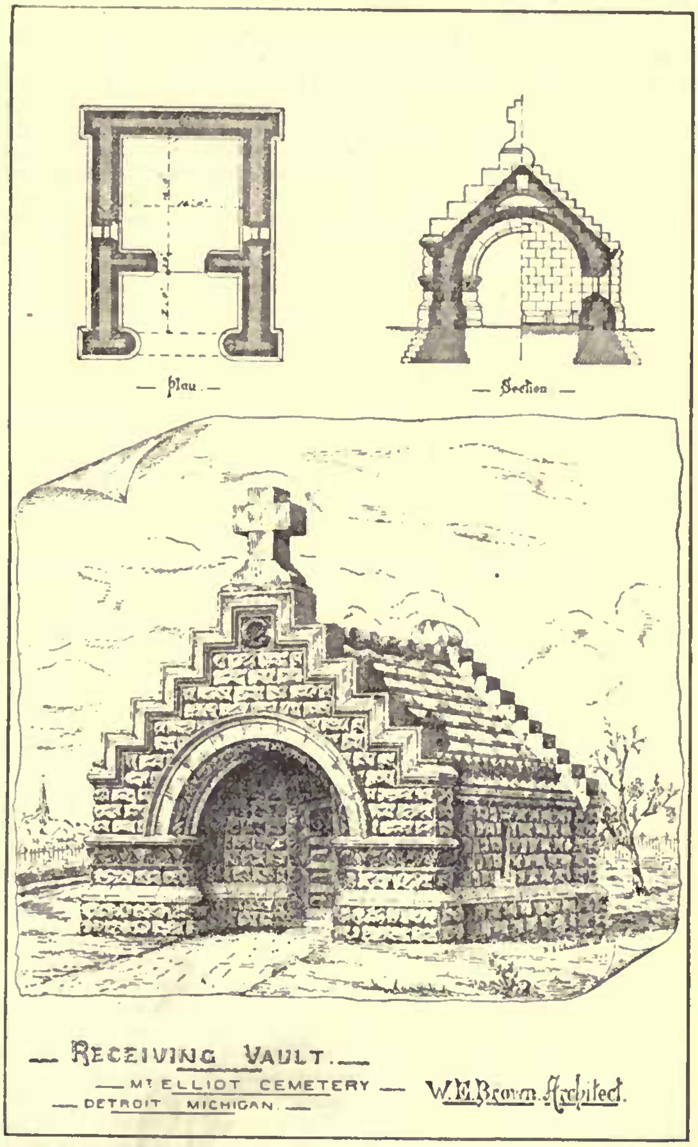
THE estimated cost of this building is $60,000.

STORE FOR MESSRS. DE COSTER & CLARK, ST. PAUL, MINN. MR. J. W. STEVENS, ARCHITECT, ST. PAUL, MINN.

STORE FOR MR. M. E. MAYALL, ST. PAUL, MINN. MR. J. W. STEVENS, ARCHITECT, ST. PAUL, MINN.

CHRIST CHURCH, HERKIMER, N. Y. MR. R. W. GIBSON, ARCHITECT, ALBANY, N. Y.

SOME GENERAL OBSERVATIONS ON THE STRENGTH AND STABILITY OF MASONRY. — I.



HERETOFORE experimental investigation, into the strength of building stones, cements and mortars, has been directed chiefly to the determination of the ultimate resistance under tensile or compressive stresses, neglecting for the most part observations on the compressibility of the material. This has been a very important omission, for without knowledge of the behavior of the component parts under stress, it is, of course, impossible to so proportion a structure that each part shall carry its share of the load, and the result generally reached is that some parts are seriously overstrained while there is a corresponding understraining elsewhere. Examples of this kind are of frequent occurrence in architectural work, and the unequal distribution of stresses are made manifest by the development of visible defects to such an extent that it is difficult to choose

which are perfect specimens of successful photography; the view of the chancel and the interior of the great tower looking upwards being especially notable.

There are two plates which will attract most attention, one the portrait of Mr. Richardson, who is here shown in what looks like a disguise for a fancy-dress ball, but which those who know the semi-invalid condition against which he so long struggled, and also recall the eager and nipping airs that drew through his great study and its adjoining work-rooms, will recognize as a hooded dressing-gown from which he extracted much solid comfort. It has all the effect of intention, however; as if feeling that he was working in the same direction and along the lines of the old monkish freemason, he had come to believe that if clad as they were, he could better understand how they would solve the problem before him, and so secure that consistency for which he always strove. The great emphatic autograph below is full of character, and scales with the man. The grim face and the set mouth give a hint of the spirit which rode down all obstacles animate and inanimate that stood in his way. One feels that this is the architect, the builder, but it gives no glimpse of the man whose social powers and *bonhommie* made him the most entertaining of hosts, the most amusing of acquaintances.

The other plate which attracts attention is the colored print of the building from the east, the view which is most typical and most satisfying. As a piece of color-printing it is a most successful and accurate work, and adds immensely to the value of the work by exhibiting truthfully the colors of the materials used in the building. If the same process could have been applied to some of the interior views, the gain would have been great: that it was not, could not have been because of any shortcomings in the possibilities of the process, but because the publishers were unwilling to make the work so expensive as to be out of reach of those who only carry modest purses.

It gives one a shock to find on the title-page Mr. Gambrill's name as architect with Mr. Richardson, whose name alone has for many years been associated with the building, and we cannot help feeling that he was spared many a pang by not living long enough to discover how completely it was forgotten that he had ever had anything at all to do with the church. We have heard it whispered that Mr. Gambrill's untimely death was, in some degree, brought about by his chagrin at finding his partner was in the public mind more intimately associated with the work done by the firm than he felt was just and proper. However this may be, we are glad that, through what would have been an excusable piece of carelessness, Mr. Gambrill's name was not forgotten.

THE worthiness of Philibert de l'Orme[1] to occupy a portion in the heirarchy of great architects, must now be taken a great deal upon faith. His contemporaries speak of him as the equal of the great Italians of the Renaissance period; and although he constituted himself their rival, and was a thorough *chauvin*, there is no reason to doubt the justness of contemporary opinion. Indeed, the fragments of his work which remain, prove the judgment of his friends to have been correct. Unfortunately, very little remains. The Tuileries was partially destroyed by the Communists, and party feeling has caused the ruins to be pulled down. However much we may sympathize with the desire of the French Republic to destroy all the remains of former despotisms, we cannot but feel that the destruction of a palace will not prevent the return of a monarch. Plenty of suitable lodgings remain for the sovereign should he ever want them. The pulling down of the ruins of the Tuileries was the action of carping vandals — as well might they destroy Versailles, the Trianon, Pierrefonds and even the Louvre, for they were all built by despots, and architecturally, they do not possess the merits of the Tuileries. That the latter was too much wrecked to be rebuilt is far from the fact — it was no more so, than many other buildings; and *had* it been restored, it would have put an end to the endless discussions as to what to put in its place. A new building would not be in harmony with the Louvre; and without a building, the Louvre looks mean, isolated as it is in so much space. The Champs Elysées and the Louvre are not in a direct line, and now that the old palace is gone, this defect is only too evident — this probably is the reason that the whole space is still occupied by shanties such as I imagine might be seen in a new squatting in the far West. But patriotism seems sometimes to run away with taste and artistic feeling, and common sense; and, consequently, if you want to study Philibert de l'Orme's building, you must go to the Trocadéro Garden, where you will find two doorways — all that has been preserved. Monseiur Vachon claims for French artists, many of the buildings hitherto forming the reputation of the Italians; and he considers de l'Orme's great merit to have been, raising the character of French art; that is to say, Frenchifying the Italian Renaissance. Thus M. Vachon: "*Toutes les grandes œuvres architecturales, toutes les merveilles d'art, dont elle (la Renaissance) a couvert notre pays, étaient attribuées presque exclusivement aux artistes Italiens que Charles VIII, Louis XII et François I avaient amenés en France. Vignole avait bâti Chambord, qui est de Trinqueau et Jean Marchand; Giocondo, Gaillon, l'œuvre collective, incontestée aujourd'hui, de Guillaume Senault, Pierre Fain, Pierre Delorme; le Dominique de Cortone, dit le Boccador, reçevait exclusivement tous les honneurs de la construction de l'Hôtel-de-Ville de Paris, que j'ai tenté de restituer à ce glorieux méconnu, Pierre Chambiges. A Serlio nous devions Fontainebleau et Saint-Germain-en-Laye, dont les vrais architects sont ce même Chambiges et Gilles le Breton.*"

Philibert de l'Orme was born about the year 1515. He styles himself "*Lyonnois*," and puts this, his birthplace, before his honorary titles of "*Conseiller et Ausmonier du feu roy, d'abbé de saint Eloy de Noyon.*" His father sent him to Italy when very young to study the great masters' works; and at Rome he seems to have entered the Pope's service for a time; but in 1536 Cardinal du Bellay made him return to France, and he began building for Général de Bretaigne in Lyons. A document discovered in 1858 in the Bibliothèque Nationale informs us that he was named architect to the king, and in this capacity he seems to have been engaged in inspecting the fortresses of Brittany. Curiously enough, he not only found the castles and fortifications wanting repair, but the finances in confusion, and he set to work to put both in order. Nor was he wanting in energy, diligence and vanity; for according to his own account, had it not been for him, the English would have taken Brest. As it was he mounted all the available artillery, and painted false guns on the ramparts to deceive the enemy; he got together some of the inhabitants as false soldiers, and setting up pikes without men, thus frightened away the enemy.

In 1548 he was nominated Inspector of the Royal Palaces, and was given the revenues of several abbeys. But his natural pride, his vanity and his love of reform; his rigid honesty, his avarice and his desire to prove his contemporaries guilty of robbing the State gained him many enemies in spite of the protection of the king and his favorite, Diane de Poitiers. Bernard Palissy spoke of him as "*un architecte françoys qui se faisoit quasi appeler le Dieu des maçons ou architectes, et d'autant qu'il possedoit vint mil (livres) en bénéfices et qu'il se sçavoit bien accommoder à la Cour.*" The first volume of de l'Orme's "*Architecture*" is full of laments about the calumnies of which he was victim, and the cabals that were formed against him. He justifies his possession of ecclesiastical revenues as being payment for his work and what he had laid out upon it. But if he were scandalized, he knew how to revenge himself. Upon almost every page of his "*Architecture*" are the most bitter allusions to his contemporaries, who "as draughtsman of plans, mostly knew not how to draw them," "*si ce n'est par l'ayde et moyen des peinctres, qui les sçavent plus tost bien farder, laver, ombrager et colorer, que bien faire et ordonner avecques toutes leurs mesures.*" And, carried away by his anger and his convictions, he devoted the last chapter of his book to a psychological study of a true and a false architect, with caricatures drawn by his own hand. M. Vachon reproduces the plate of the good architect, which resembles some of the allegorial cuts of Albert Dürer in style.

On the death of Henri II, de l'Orme fell into disgrace. Robbed of the patronage of Diane de Poitiers, he lost his Inspectorship of Royal Buildings, and had the mortification of seeing Primaticcio put into his place; but the ecclesiastical benefices he seems to have kept until his death in 1570, which took place in his house in the cloisters of Nôtre Dame, Paris, of which he was a canon.

The project of erecting a palace, "des Tuileries," was conceived by François I, but the idea was not carried out until after his death. Catherine de'Medici entrusted the work to Philibert de l'Orme, but she seems herself to have made certain suggestions to the architect. Desiring as she did. to have a building which would be the direct opposite to the sombre fortresses of the Louvre and the Tournelles, her idea was to surround it with gardens, and to make it picturesque. De l'Orme chose the Ionic Order, because he says "*il est féminin et a esté inventé après les proportions et ornements des Dames et Déesses, ainsi que le Dorique des hommes, comme m'ont appris les anciens; car quand ils vouloient faire un temple à quelque Dieu, ils y emploient l'ordre Dorique et à une deesse le Ionique.*" Where de l'Orme learned this we cannot tell, as a very limited study of the work of the "ancients" proves the fallacy. To go no farther than Athens, the Parthenon (the temple of Athena) is Doric; but doubtless study of the antique in Philibert's time was confined to Rome and a few other Italian towns. However that may be, he considers the Ionic "*délicat et de plus grande beauté que le Dorique et plus orné et enrichy de singularitez.*" Certainly these qualities may have fitted it to be the style of a palace built for Catherine de'Medici, especially its singularity. But the Queen's Florentine tastes desired that the palace should be a mass of marbles and incrustations, and no doubt had it been finished by de l'Orme it would have equalled some of the Italian palaces of the period, for the plan of it left by du Cerceau, shows the grandiose scale upon which it was to be built. The original design for the central pavillon was a sexagonal attic supporting a dome. This was never carried out, de l'Orme's building only being partially finished at his death, when it was committed to Bullant, Lemercier, Levau and d'Orbay in succession, who all of them modified the original designs; the last architect replacing the beautiful staircase with a commonplace one with a balustrade decorated with the emblems of Louis XIV.

But de l'Orme's greatest work was the Château d'Anet, built for Diane de Poitiers. Possessing an immense fortune and being a woman of taste, she desired the building to be original, grand and noble. Moreover, being the rival of the queen, she wished to out-do the latter's new palace in magnificence and to erect a building which should be purely French. This being so, what more natural than that she should endeavor to carry off the queen's architect.

The plan of the château shows a central building surrounded by gardens, terraces, and out-buildings, including a chapel and *hôtel*

[1] *Les Artistes Célèbres, Philibert de l'Orme*, par Marius Vachon: Rouam, Paris.

dieu, the whole enclosed by a moat and external walls. The entrance was a triumphal arch, in the tympanum of which was the celebrated bronze group of Diana and the Stags, by Benvenuto Cellini, which was executed by order of François I for Fontainebleau, and afterwards taken to the château d'Anet by Henri II at the instigation of Diane de Poitiers. This alto-relief, now in the Renaissance Museum of the Louvre, and called the "Nymph of Fontainebleau," was placed in 1806 above the gallery by Jean Goujon, at the entrance of the Salle des Caryatides of the Museum. In 1846 it was taken down and replaced by a cast, which still remains. At the angles of the arch, on each side of the "Diane," were two Fates in bronze, also by Cellini, while at the sides of the niches were bronze heads of winged cupids. The following inscription was placed upon a black marble tablet above the door:

Phœbo sacrata est almæ domus ampla Dianæ
Verum accepta cui cuncta Diana refert.

On the façade of the château we read another inscription, which shows a curious trait in the morals of the sixteenth century:

Bræzeo hæc statuit pergrata Diana marito
Ut diuturna sui sint monumenta viri.

For what was Diane "*reconnaissante à son mari de Brézé*"? This façade was destroyed in 1799–1810, but a portion of it was saved by Alexandre Lenoir and placed in the Musée des Petits-Augustins, may now be seen in the court-yard of the École des Beaux-Arts, which occupies the same site. De l'Orme, with his usual vanity, speaks of his work thus: "*J'ay fait faire au château d'Annet entre plusieurs belles œuvres* ——," and then he enumerates his several works. The chapel, which is domical, and a remarkably beautiful example of French Renaissance, with one wing of the château, is all that remains of the splendid building. The chapel was restored by Caristie in 1844.

Another of de l'Orme's famous buildings was the Château de Saint-Maur-les-Fossés, belonging to the Cardinal du Bellay, bishop of Paris. This, too, has disappeared — it was destroyed before the Revolution. Engravings from the artist's book on "*Architecture*" of this, the château d'Anet and the Tuileries, with plans, are all reproduced in M. Vachon's book.

But there is one of de l'Orme's works which can be studied in all its original beauty, viz., the monument of François I at St. Denis, one of the most beautiful tombs of the Renaissance. The monument is of the form of a triumphal arch, with Ionic columns supporting a platform, upon which are kneeling figures of the king, Claude, his wife, and three children. Underneath the arch is a sarcophagus, upon which repose the figures of François and Claude, while all around the lower part are bas-reliefs by Pierre Bontemps, representing the various campaigns carried on by the king. De l'Orme was assisted in this work by other sculptors besides Bontemps—Germain Pilon, Ponce Jacquiand, Françoys Marchand, Ambroise Perret, Jacques Chanterel, Bastien Galles, Pierre Bigoine and Jean de Bourges. De l'Orme also carried out work at St. Germain-en-Laye, at Fontainebleau, at Vincennes, at Chenonceau and at Madrid, in the Bois de Boulogne.

M. Vachon excuses de l'Orme's egotism and vanity because of his hatred of the foreigner. At that period, the connection of the sovereigns with Italy through their wives, and the wars which were carried on in that country, naturally forced the beauty of Italian buildings upon the notice of men of taste like François I. Consequently, he invited a whole corvey of Italian artists to France. Of these, de l'Orme and his friends were jealous, but unjustly, for he had himself studied in Italy and owed his success to that study. That he was a man of genius there is no doubt, but his talent consisted in acquiring knowledge from the Italians, which he applied to his own wants. That he created a French Renaissance is true, but that it was modelled upon the Italian is equally true. M. Vachon is a patriot and de l'Orme's chief merit in his eyes is that he was "*bien Français*" but art is not a matter of patriotism, it is cosmopolitan, and far more was it to the credit of de l'Orme that he had true ideas upon the right uses of art than that his art was "*bien Français.*" He desired that buildings should be suitable to the purposes to which they were to be put. "*Mieux vaudrait,*" he says, in his first volume of "*Architecture,*" "*ne savoir faire ornements ni enrichessements de murailles ou autres, et entendre bien ce qu'il faut pour la santé et conservation des personnes et des biens.*" This is a golden rule which might to advantage be observed in these modern times.

S. Beale.

SOCIETIES

NEW YORK CHAPTER OF THE AMERICAN INSTITUTE OF ARCHITECTS.

EXTRACT from minutes of the New York Chapter of the American Institute of Architects:

"*Whereas*, the Commissioners of the Sinking Fund of the City of New York have, under authority given to them by an act of the Legislature entitled 'An Act to provide for the erection of a building for Criminal Courts and other purposes,' issued on invitation to architects to prepare plans, in competition, in accordance with certain printed instructions and general plans."

The New York Chapter of the American Institute of Architects, having at heart the proper architectural embellishment and future architectural standing of this metropolis, believe it to be their duty, which they owe to the municipal officers, to the citizens, to the profession of architecture, and to themselves, to earnestly advise against the adoption or execution of any plans based upon the instructions and general plans issued, and would recommend to the Commissioners, if it is still their determination to place the proposed structures on the City Hall Park, in contiguity to the City Hall, that sufficient extension of time be granted, and the following conditions be observed:

1st. That the manner of grouping the buildings and the planning and distribution of the rooms be left to the competitors, limited only by the specified requirements of space for the various departments, etc., to be accommodated.

2d. That disinterested professional experts, who should be architects of acknowledged ability, experience, and standing, should be appointed, to whom all the plans would be referred for analysis and classification, and who would make a detailed report to the Commission for their consideration, with recommendations as to the award of premiums and choice of plans.

3d. That the successful competitor should be appointed architect of the building; provided that in case he should not be, in the judgment of the said experts and Commission, a person of sufficient artistic or constructive or administrative capacity, then there shall be appointed an associate or consulting architect, so qualified, whose compensation shall be deducted in equitable proportion from that of the architect.

A. J. Bloor, *Secretary*.

A true copy.

COMMUNICATIONS

WHO SHOULD PAY THE EXPERT?

Albany, N. Y., February 4, 1888.

To the Editors of the American Architect:—

Dear Sirs,— Will you kindly favor us with your opinion in regard to case stated below; we dislike to take up your valuable time, but it is a matter of adjustment depending on what is customary or right.

We are architects for a large hall to seat 2,500, and the heating and ventilation is of the greatest importance. The Committee and ourselves are both desirous of having the heating and ventilating plans prepared by an expert, and the question arises, who shall pay for such expert work. We claim that after the heating plans are prepared that we will have to lay out all flues, etc., on builder's plans, and, in addition, must get all estimates and give special superintendence to this part of the work, as expert is non-resident and is not employed to do that portion, and that we should not pay expert from our commission, but that he should be paid in addition to per cent we receive on the entire work including heating and ventilation.

Respectfully yours, Enquirers.

[In regard to the question, Who should pay for expert advice about heating and ventilation, we think that most experienced architects would agree that the heating and ventilation of a building was a matter strictly within the architect's province. If, as often happens, the architect wished to have his plans for it criticised by an expert, and to obtain suggestions in regard to details, he would do so in such manner as he might wish, paying the expert out of his own pocket, and, of course, in such a case, the expert, being only called in for comments upon the work of the architect, his fee would be a small one. If, instead of this, the committee desires to deprive the architect entirely of a responsibility which, with such advice as he can procure for himself, he is willing to take, and to trust the whole matter to an outsider, leaving to the architect the care of carrying out the expert's ideas, we think that the committee should bear the whole expense. Although the architect is nominally relieved of a part of the responsibility which he is paid for taking, he really gains little or nothing in this respect, for if he is obliged to look out for the execution of the plan, he is sure to have all imperfections in the working of the scheme charged to his account, while the extra labor thrown on him by the necessity of changing his plans for the arrangement or decoration of the building to suit the wishes of an outsider who cares for nothing except his own scheme, will be very considerable. — Eds. American Architect.]

THE COMMISSION ON A PARTY-WALL.

Chicago, Ill., February 13, 1888.

To the Editors of the American Architect:—

Dear Sirs,— What would be a reasonable and proper charge to make a client for computing the value of party-wall, making and submitting a statement of same? I do not find any official statement of fees, and am somewhat uncertain as to what custom has sanctioned. Owing to some delay in using the wall, after the statement had been submitted the actual settlement was made between the two owners themselves, instead of through their architects. My client accepted the offer of $3,000 for the wall. My statement made the value of the half sold $3,109.87, which included $119.61 as architect's commission. This last item was objected to by the architect of the purchaser, he claiming that he was entitled to architect's commission on the wall purchased by his client. Of course, it made no difference to me as I had already been paid my commission, but I would like your views upon the question as to which was right, if either, in the light of established precedent. Also what, under the circumstances as detailed, a proper charge would be for my services

in computing the value of the wall, drawing up statement and spending some little time — perhaps one-half day — in visiting the owner and the other architect before the matter was finally adjusted.

Very respectfully, O. J. Pierce.

[We should say that the best way would be to charge according to the time occupied in the work of making estimates and preparing the statement, reckoning the value of the time according to the architect's engagements.

It is customary in this vicinity to count the commission of the architect under whose direction the wall was built as a part of the value of the wall, to be shared between the parties, just as Mr. Pierce estimates it; but this does not at all affect the right of the architect of the adjoining building to charge his commission also on it, under the general rule that the architect's commission is always reckoned on the total cost of the structure ready for occupancy, including materials furnished by the owner. Both architects are therefore right in their view of the case. — Eds. American Architect.]

THE ARCHITECTURAL LEAGUE COMPETITION.

Los Angeles, February 4, 1888.

To the Editors of the American Architect: —

Dear Sirs, — Having seen the prize designs in the late Architectural League Competition, I can say nothing against either of them regarding their fitness as ornaments to a village green, but I feel disposed to take exception to the manner in which the programme was worded.

It is apparent that if only three of forty-four competitors properly interpret the problem, that the committee should have used a phrase to more clearly define the same than the word "tower," which means a high edifice. The forty-one competitors who were, unfortunately, in ignorance of the fact that the word "tower" meant a *low* edifice is such a large majority of all as to raise at once the query, Why so many dullards? — a fact which (being one of the dullards) I attribute to the wording of the circular of the competition.

Very truly yours, Willis J. Polk.

ADDRESS.

New York, February 13, 1888.

To the Editors of the American Architect: —

Dear Sirs, — The address of the Secretary of the *Journal* of Associated Engineering Societies, called for in a recent number, is Henry G. Prout, 71 Broadway, New York. Yours very truly,

C. Powell Karr.

NOTES AND CLIPPINGS

Combustibility of Iron. — Some curious experiments to demonstrate the combustibility of iron were made by the late Professor Magnus, of Berlin, Ger. In one a mass of iron filings is approached by a magnet of considerable power, and a quantity thereof is permitted to adhere to it. This loose, spongy tuft of iron powder contains a large quantity of air imprisoned between its particles, and is, therefore, and because of its extremely comminuted condition, well adapted to manifest its combustibility. The flame of an ordinary spirit lamp or Bunsen burner readily sets fire to the finely-divided iron, which continues to burn brilliantly and freely. By waving the magnet to and fro, the showers of sparks sent off produce a striking and brilliant effect. The assertion that iron is more combustible than gunpowder has its origin in the following experiment, which is also a very striking one: A little alcohol is poured into a saucer and ignited. A mixture of gunpowder and iron filings is allowed to fall in small quantities at a time into the flames of the burning alcohol, when it will be observed that the iron will take fire in its passage through the flame, while the gunpowder will fall through it and collect beneath the liquid alcohol below, unconsumed. This, however, is a scientific trick, and the ignition of the iron is due to the fact that the metal particles, being admirable conductors of heat, are able to absorb sufficient heat during their passage through the flame — brief as this is — and they are consequently raised to the ignition point. The particles of the gunpowder, however, are very poor conductors of heat, comparatively speaking, and during the exceedingly brief time consumed in their passage through the flame, they do not become heated appreciably, or certainly not to their point of ignition. — *Springfield Republican.*

Natural Gas in England. — Mr. Richard S. Bluck writes to the *Peterborough Advertiser:* "Many of your readers are aware that on the Fletton and Woodstone side of Peterborough there are a number of brick-works, but perhaps they may not know the lower the clay for making bricks is obtained, the less coal it takes to burn the bricks. After getting some few feet down, the clay contains natural fuel, and the deeper the clay is dug, the more natural fuel it contains. When the bricks made from the lower clay (which is really a shale) are being burnt, they throw out a gas which can be clearly seen burning in the kiln between the bricks, and I wish to point out the great probability of there being at no great distance below the shales now worked stores of natural gas similar to that now used in Pittsburgh, Pa., and lately discovered in north-western Ohio, and which, if found, would make Peterborough into one of the most important manufacturing centres in the world. Builders in Peterborough are aware that bricks can now be bought cheaper at the Fletton and Woodstone yards than anywhere in England, the reason being the coal-bill is so much reduced since the lower shales have been made into bricks. I would most respectfully ask the Peterborough Town Council to consider the desirability of boring down to see if the gas is below the town of Peterborough. As a matter of course, it is needless for me to point out to so able a Board of business men how natural gas, if found, would find employment for every man in the district who was willing to work, how it would increase the value of all property in the neighborhood, and cause manufactories and new industries to spring up on every side."

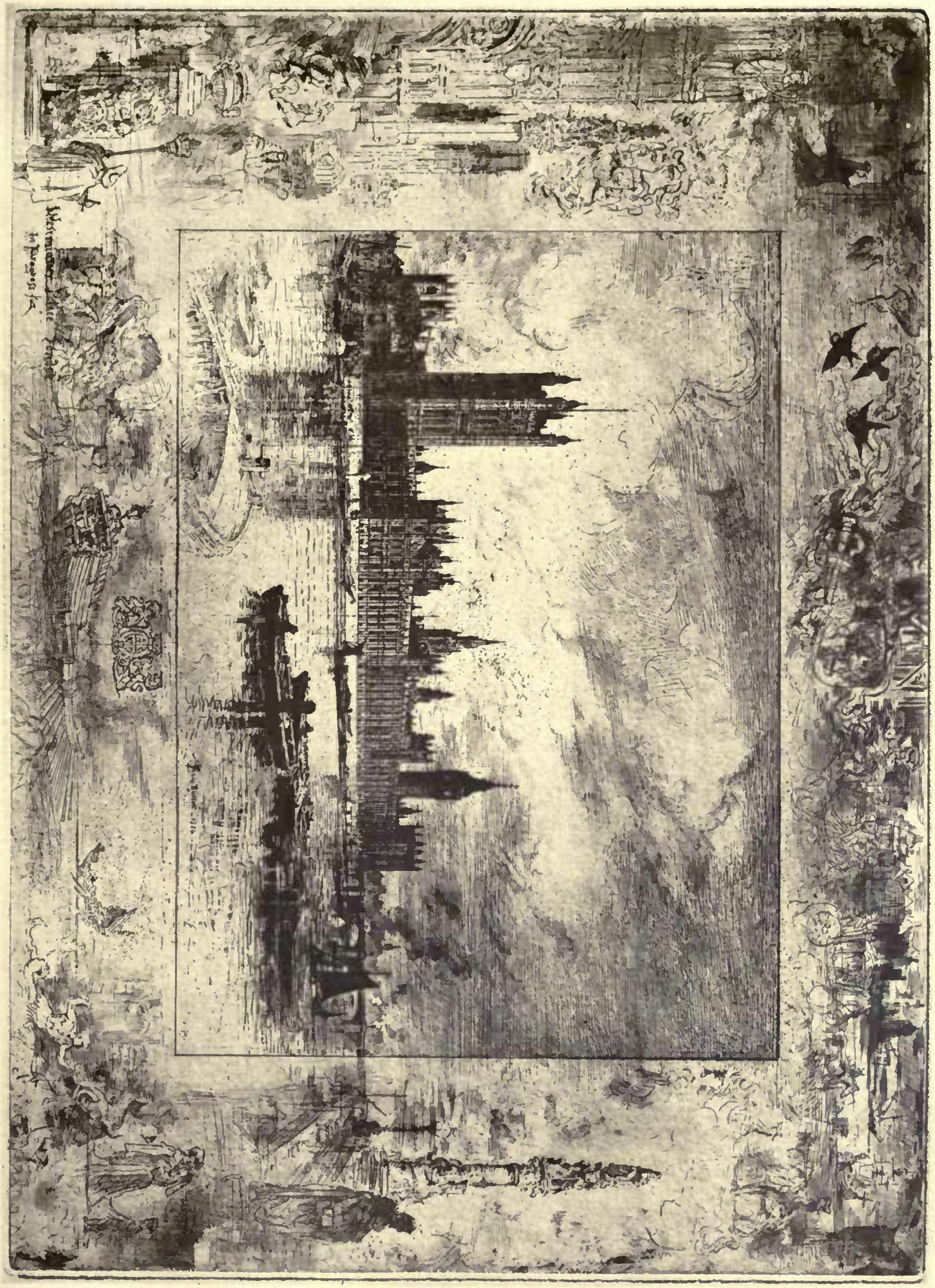
TRADE SURVEYS

"Traffic is up to the average" summarizes the reports in some fifteen or twenty trade journals of the past week. Not a few journals speak of the upward tendency in values and prices, and those editors who are inclined to take a hopeful view of things, say, the outlook is decidedly better than it was twelve months ago. So far as the opinion of editors of trade journals and writers of financial articles go, there is very little to fear and very few regrets to be expressed with the volume of business which has been transacted since January 1. Reports from all quarters are favorable for a steadiness of productive capacity throughout the winter. Reading between the lines and going below the surface, facts and conditions are met with which must modify the hopefulness that is so freely expressed in so many quarters. Yet, the trade representatives are doing good service, and financial writers are accomplishing some good in checking a decline in confidence where there may be really no good reasons for it. At the same time there are some influences at work which will have their way regardless of what people may say about them. One of these influences concerning which but little is said, and, perhaps, less noticed, is the disposition of a great many large consumers and operators to purchase material only for immediate requirements. If this policy could be kept up year in and year out, it would be much better for all concerned. The opinion is entertained by some that business is never good unless people are buying what they do not want, and what they do not expect to use for from one to six months ahead. We are having less prosperity of this kind than usual, and perhaps more of the prosperity which is based upon the purchase or immediate and actual requirements. To the extent that this policy affects prices, prices are declining. There is nothing of a speculative character to be met with or to be found in stock-broking circles. Even in our stock-boards complaint is made of the absolute dulness and the absence of outside buyers. The outside buyers for once are showing good sense in allowing speculators and boomers of stocks to have their own way. This is due largely to the experience of the past two years in manufacturing and legitimate commercial directions of the great body of private speculators who are awaiting developments. The general public who have experience and labor to sell and trade requirements to fill, have but little interest in the ups and downs of stocks, but are chiefly interested in the actual condition of things apart from their speculative values. A little study of these conditions will throw a great deal of light upon the present and future trade prospects. Since the opening of the year $70,000,000 worth of bonds have been sold, and it is believed that most of them have been taken by foreign and small investors. A host of engineering and other enterprises are before the public wherein money can be invested, whether safely or not, it is not an easy matter to say. Opportunities for railway investment are growing smaller, because of the fact that established railroad companies are doing the bulk of the new railroad building. This is true largely of mining operations. Large companies are extending their operations without outside help. Individual investors will, in time, be compelled to organize special agencies to secure safe investments. There are combinations among investors in new schemes and enterprises, as well as combinations in trusts and syndicates. The outflow of money on Western bonds and mortgages still continues. The opportunities for profitable investment are increased rather than otherwise on account of the great expansion in manufacturing throughout the West. Money is wanted there, and will, no doubt, seek the opportunities that are being offered. The fact that $200.000,000 will be divided among holders of railway bonds and securities this year will help to strengthen the confidence in the earning capacity of our railway systems. The fact that there is a vast amount of uncovered territory in the West and South will, in all probability, lead to the projection and the construction of a number of new roads there. The importance of this fact cannot easily be overestimated. Just now the opinion is entertained that railway construction will fall far below the limit of last year. But the necessity of covering railroad territory against competitors is not fully taken into account. Last week two or three permanent railway enterprises were brought to the attention of a few large financial organizations in New York, in which railway managers are interested. Whatever assistance is wanted by the railroads themselves will be obtained from these quarters. Another important fact of recent development is the early emigration of a large number of manufacturers, mechanics, traders and others into the region west of the Mississippi river. The competition East and the better opportunities West, coupled with the abundance of money which can be borrowed and aided by the prospects of continuance of business prosperity, has laid the foundations for something like an exodus of a most desirable class of people. Iron and steel makers, carriage and wagon builders, hardware manufacturers, house-builders, material manufacturers, lumber-dealers, coal-miners, among other equally valuable factors in industrial development will seek new homes and opportunities in the new region made available by the 20,000 miles of railway-construction in the far West during the past three or four years. This movement simply means that there is a new force at work to equalize energy, labor and capital, and that the West will receive the first benefit of it, and the East the resulting benefit of the equalization.

Without theorizing or dealing in generalities, it may be said that this movement is a wide and a far-reaching one, and it may be said that there are such abundant opportunities for a spreading out of the population that no very serious results need be apprehended to the industries at large. Labor, in general, is well engaged. The anthracite strike is practically over, the Northwestern Railway war will be ended, perhaps, in two weeks. Other railway systems have taken warning and are putting their defences in order. The industries of New England anticipate an early revival of trade, and all its mills and factories will be pretty well employed. The multiplication of combinations still continues, but the Government, State and National, is on their path with a view of keeping them from trampling upon the public. How much Legislation can prevent or retard this tendency it is not easy to say, but vast combinations are the legitimate and necessary result of the conditions under which we live, and it is probably safe to say that nothing more than a police surveillance can be kept upon them.

S. J. Parkhill & Co., Printers, Boston.

Copyright, 1888, by TICKNOR & Co.



WESTMINSTER PALACE, AFTER AN ETCHING BY FELIX BUHOT.

HELIOTYPE PRINTING CO., BOSTON.

THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. XXIII. No. 636.

Copyright, 1888, by TICKNOR & COMPANY, Boston, Mass.

MARCH 3, 1888.

Entered at the Post-Office at Boston as second-class matter.

CONTENTS

A PRACTICAL MAN writes to the *Oesterreichisch-ungarischen Eisenzeitung* some of his observations about the action of cement upon lead, which are new to us. Every one knows that bits of plaster, falling from a ceiling into a lead-lined cistern or tank, will often perforate the lead in a few weeks, and experiments carried on in Germany have demonstrated that under certain circumstances there is a strong chemical action between lime or cement and lead, but just what the circumstances are under which the action takes place no one seems to know. The Practical Man does not know, any more than other people, but his experience seems to show conclusively that certain qualities of lead are affected, while others are not. His first observation was made in 1880, when he was summoned to look for the cause of a leak in the ceiling of a room in the house of Count Karolyi, in Budapest. Over the room was a bath, made in a manner which is, we hope, peculiar to the Danube provinces, by building a brick enclosure in cement, plastering it inside with cement-mortar, and then casing over the outside with marble, and lining the inside with heavy sheet-lead, over which was put a thick coat of cement, in which were set tiles, to form the visible interior lining of the tub. On pulling away the marble, and breaking out the tiles, the lead-lining was found to be very badly corroded on both sides. On one side it was eaten through, so that the water escaped, and soaked into the masonry beneath, and on the other, although not perforated, the metal had become converted into a brittle, powdery substance. A year later the same expert was called to the house of Count Zichy, where a wet spot showed itself under a bath-room. This bath was precisely similar in construction to the leaky one of the year before, but had been in place for a much longer period, so the Practical Man and his assistants tore it to pieces with confidence, sure of finding the lead corroded by the cement. To their surprise, after the tiles were removed, the lead proved to be in perfect condition. No trace whatever of corrosion could be discovered, and the leak was soon afterwards found in a waste-pipe. As there was no apparent difference in the circumstances, the immunity of the Zichy tub from corrosion was quite as inexplicable as the perforation of the Karolyi one, and the Practical Man did not try to account for it. However, these cases seemed to interest him in the matter, and he took pains to collect specimens of lead-pipe which had been buried in mortar or cement. Out of a large number of these many were found as perfect as when newly set, yet many more were corroded to a greater or less degree. With only these facts as a basis, it would hardly be possible to form any deduction in regard to the matter, but the writer of the letter very sensibly suggests that some one with more time than himself might with advantage collect samples of lead from different manufacturers, and of different brands of cement and lime, and test the mutual action of the various sorts, for the benefit of mankind.

THE present year bids fair to be one of great fire losses, the six or seven weeks already expired having been distinguished by about an equal number of very destructive conflagrations. The total losses by fire last year, according to the *Insurance Standard* were something more than one hundred and five million dollars, or two million a week. This is about two hundred dollars a minute, so that supposing the cost of insurance and fire protection to be as much more, which is, we believe, nearly the case, the people of this country send up twenty-four thousand dollars every hour of the day and night in smoke as incense to the spirit of cheap construction. Of human sacrifice this American deity last year demanded less than usual, but the present season has commenced with a liberal offering, and the chances are that his appetite will be fully supplied before the year is over with the young girls and children which satisfy it best. The statistics of 1887 seems to indicate that a slight change for the better is taking place in our older communities in methods of construction. Thus the losses in New England, with a population of three and one-half millions, were but seven per cent greater than those of Illinois, which has a population of about two and one-half millions. Moreover, among the large fires, the greatest losses appear to occur in places where the art of fighting and preventing fires has not been so long practised as in the Eastern Cities. New York, as is natural for a place containing such vast accumulations of city goods, shows a large average loss, the destruction of property in the two hundred and three conflagrations which consumed more than ten thousand dollars' worth of goods during the year having been nearly fifteen million dollars, or seventy-three thousand for each. In Massachusetts the average was only twenty-seven thousand dollars, and in Pennsylvania forty-nine thousand, while it was one hundred and two thousand in Wyoming, one hundred and sixteen thousand in Wisconsin, one hundred and nine thousand in Minnesota, and ninety-one thousand in Florida.

WE have before mentioned the Asphaleia Company, which undertakes the construction and arrangement of theatres in any part of the world, and has adopted a large number of devices for improving the construction of theatre-buildings and facilitating the work carried on in them. The first theatre built by the Company was, we believe, the Royal Opera-house at Buda-Pest, and many radical changes in the arrangement of the stage and the setting of scenery were introduced there. Since then the company has built another important theatre, the Stadt Theatre at Halle. So far as means permit, the Asphaleia buildings are fireproof, but by intelligent study of the problems of stage mechanism, an unusual degree of safety is secured, even with the ordinary materials. On the stage, for instance, the old-fashioned system of "fly-bridges" and light scaffolding for manipulating scenery and lights is entirely done away with. Our readers will remember the ingenious panoramic mechanism by which a painted sky, running on vertical rollers, is made to encircle the Asphaleia stage, and is gradually changed by the movement of the rollers, if the piece demands effects of sunrise, twilight or approaching storms. This device supersedes the dangerous and ridiculous "sky borders," or strips of painted canvas which depend from the upper part of the stage in most theatres, close to the gas-lights, and in the best possible place for setting the building on fire, and leaves the stage ceiling open and unobstructed. As a certain amount of hoisting of angels and other properties has to be done from the roof, wire ropes are provided for doing this work, but they are so arranged as to be operated from a single station, where is also concentrated the management of all the other stage machinery. The master-machinist, from this post, has a complete view of the stage; under his hand are levers, valves, and so on, and to him alone, with his assistant, is committed the control of all the traps, ropes and other mechanical appliances of the stage. The Asphaleia traps are simply small direct-acting hydraulic elevators, having a piston attached directly to the under side of the trap, and moving in a cylinder to which water is admitted under pressure by means of valves in the machinist's station. It is evident that theatres built on this system must be costly, but experience shows that in this country, at least, a radical novelty in the construction of a theatre is one of the surest means of attracting business.

THE *Journal of the Royal Institute of British Architects* contains an interesting note from Signor Giacomo Boni of Venice on the ancient building known as the Fondaco dei Turchi in that city. Although as purely Byzantine in type as

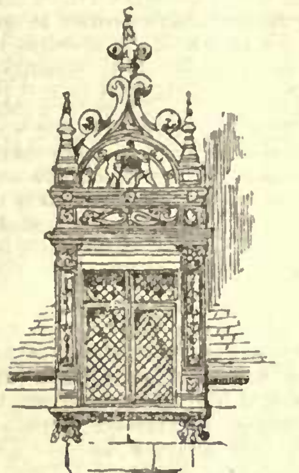
St. Mark's itself, and usually attributed to the tenth century, it seems, according to Signor Boni, that it was built about the year 1230, by Giacomo Palmieri, Consul of Pesaro, who was driven from his own city by a hostile faction, and settled in Venice. Although he retained his family name of Palmieri, which was inscribed on his tomb when he died, his new palace was known in the Venetian dialect as the Ca' Pesaro, from the town in which he had once been the principal citizen, and his descendants were known by the name of Pesaro until the extinction of the family in 1830. Palmieri's son, Angelo Pesaro, seems to have been very proud of his father's architectural achievement, and in his will, which is dated 1309, and is still extant, he bequeathes it to his son Nicolo, with an injunction to him, as well as to his other descendants, never to allow it to pass out of the hands of the family. Notwithstanding this, it was sold in 1381 to the Venetian Government for ten thousand ducats, and presented by the city to one of the Este family as "Marquis of Ferrara," apparently with the idea of gaining some point in advancing the Venetian claim to the sovereignty of Ferrara. The palace remained in the hands of the descendants of this "Marquis of Ferrara" until the seventeenth century, and it is not impossible that Lucrezia Borgia, after her marriage with the head of the family of Este in 1501, may have seen it in the course of her visits to her new husband's relatives, so that a little color is given to the name of the "Palace of Lucrezia Borgia," by which the building is known to the photographers. The Venetian branch of the house of Ferrara conveyed their palace, now somewhat dilapidated, to the Doge Antonio Priuli, who let it to some Turkish merchants as a storehouse. The granddaughter of Priuli brought it back, as part of her dowry, to her husband, Leonardo Pesaro, and for two centuries it continued to be occupied by Turkish merchants. In 1830 the Pesaro family became extinct, and the palace passed into the hands of Count Manin, who sold it to Antonio Petich, by whom it was let for a tobacco factory. About 1860 it was cleared of manufacturing appliances and rubbish, quietly restored, and fitted up for the reception of the Correr collection of local and other curiosities. Singularly enough, the walls of the Fondaco dei Turchi are built of small, unbaked bricks, known to the Venetians as *altinelle,* and supposed to have been brought from the ruins of Altinum, the city on the main land from which the first settlers, driven from their homes by the incursions of the savage Huns, are said to have taken refuge on the then uninhabited islands of the Venetian lagoon. The unbaked bricks of Altinum must have been of extraordinary quality to have been in condition for use in a new building nearly six hundred years after the house for which they were made had been destroyed, but it is certain that the "*altinelle*" now existing in the walls of the Fondaco dei Turchi show traces of colored plaster on them, which must have come from a much older building, and the tiles themselves seem, from their want of adherence to the mortar in which they are laid, to have had, when used, the greasy quality, familiar characteristic of very old bricks.

THE ancient writers have always held up to us the city and province of Babylon as the richest and most luxurious community that ever existed in the world. Even the Romans, whose wealth and splendor far exceeded anything that has been seen since, spoke of Babylon with a kind of awe; and there is no reason to doubt the substantial accuracy of the ancient descriptions of its walls, which were three hundred feet high, and enclosed an area about equal to that of London, of its bronze gates, its hanging gardens, or its temples, with their colossal statues of solid gold. Recent discoveries have made us certain of the curious fact that the Babylonians were not only the richest, but the most business-like of people, more so even than the Romans, who, however, followed them closely. Far from being the brutish and irresponsible slaves of an Oriental tyrant, the inhabitants of Mesopotamia have left abundant proofs of a thrift, a clearness and prudence in making contracts, a care in recording them, and an exactness in performing them, which is well worthy of our study. Every one remembers the extraordinary stores of records, made in cuneiform characters on cones of clay, and afterwards baked to render them permanent, which have been found from time to time, forty thousand having been discovered at once in a subterranean chamber; and the deciphering of the inscriptions on these, which has been going on for years, has given us a striking idea of the care with which such records were made and preserved. A few, recently interpreted, have proved to give what amounts to a map of a portion of the city of Babylon, by means of the accuracy of their descriptions of the boundaries of the lot conveyed, and the references to the rights-of-way of the adjoining owners. These particular records referred to the property of the firm of Egibi Brothers, who seem to have been merchants with a taste for investments in real-estate, and were dated in the twenty-sixth year of Nebuchadnezzar, or B. C. 579. Together with the deeds of this lot, which included a judicial decree in regard to some rights-of-way apparently disputed, the Egibi records contained numerous mortgages, rent-rolls and receipts, one of which contains a reference to a custom which may furnish a useful hint to modern landlords; the receipt acknowledging the payment of the rent to a certain date, and also the deposit of "ten shekels of silver as security for the new year." The *Builder*, which gives these interesting details, says that the cones or tablets are stamped with the seals of the contracting parties, and attested by witnesses. This must have been a good protection against forgery; and property seems to have been guarded as well by the banks of the Euphrates as it is now on the shore of the Thames.

THE lengthy quotation we make to-day from the *Congressional Record* is sufficiently interesting to be read attentively in spite of its length, and deserves all the more consideration for its short precession of the debate that will probably take place in the same body in consequence of the Public Buildings "grab" which has recently been engineered through the House. The discussion, if the somewhat informal talk really deserves that name, seems to promise that the bills for new and possibly not needed public buildings will not be railroaded through the upper House without some show of discussion, and perhaps salutary opposition. It shows that there are some influential members of the Senate who know something of the iniquities of the present routine method of grinding out Government buildings to satisfy the greed of political heelers, or gratify the aspirations of a present Member of Congress desirous of reëlection. But there is no positive proof that any one really comprehends the impossibility of effecting in the office of the Supervising Architect the mere administrative handling of the quarter of a billion of dollars of which the expenditure is to be one oft he results of the raid; while it does not seem to occur to any Senator that he ought to feel a premonitory shuddering at the possibility that in the course of a twelvemonth or so designs for one hundred and thirty or more new public buildings may be prepared under a system, which, according to the statement of a Senator during the debate, makes it impossible that these designs shall be such as would be prepared in the offices of architects of the highest rank, whose services so wealthy a Government as ours surely ought to be able to command.

IT is only fair to acknowledge that, having a very great interest in building and all that relates to it, it would give us more satisfaction to see the surplus expended in these enormous building operations which would distribute so large a sum of money through trades in whose welfare we have a concern, than to see it frittered away on any of the vast service-pension schemes or on so chimerical an enterprise as the Blair Education Bill seeks to set afoot. But the conscience of the citizen who abhors a "steal" of any kind is quickened by the feeling of the artist who knows what kind of work is likely to be turned out under the present system of procuring designs for Government buildings. If Congress endorses and the President approves the bills for all the new buildings which have been introduced, it will be distressing to imagine the harrying and worrying of the unfortunate Supervising Architect, subjected to the necessity of endeavoring to pacify the appointed representatives of one hundred and thirty communities and produce satisfactory proofs of his assurances that the public building to be erected for each is all that it should be and is making all desirable progress. To be Supervising Architect to the Treasury Department of the United States on a petty and inadequate salary may have its compensating glories, but a man must have a high regard for this very impalpable and unbankable commodity not to feel himself wronged and defrauded when he stops to consider that for less than fifteen thousand dollars he devotes four years to doing work for which, as a private practitioner, he might receive a million and a quarter of dollars.

OUR PUBLIC BUILDINGS AND OUR SENATORS.



Chateau du Rocher à Mézanger. France.

As there probably were no architects in the Senate Chamber galleries when the interesting discussion on February 14th of some of the peculiar methods by which our Government buildings are built took place, and as the summary in the daily papers was very insufficient, we make no apology for reproducing the discussion *in extenso* from the *Congressional Record.*

Mr. Pasco. I should like to call up the bill (S. 1723) providing for the completion of the public building in the city of Pensacola, Fla., as originally designed.

By unanimous consent, the Senate, as in Committee of the Whole, proceeded to consider the bill, which had been reported from the Committee on Public Buildings and Grounds with an amendment in line 8, before the word "thousand" to strike out "fifty" and insert "thirty-two," so as to make the bill read:

That the Secretary of the Treasury be, and he is hereby, authorized and directed to have the United States court-house and post-office building in the city of Pensacola, Fla., completed as originally designed, including tower, basement and attic stories, fences, grading, and heating, and the sum of $32,000 is hereby appropriated out of any money in the Treasury not otherwise appropriated, for the purpose herein mentioned.

Mr. Edmunds. Is there a report?

The President *pro tempore.* No report accompanies the bill.

Mr. Pasco. I will state that the appropriation is recommended by the Supervising Architect and is according to the original specifications and estimates.

Mr. Edmunds. Are there any papers from the Supervising Architect on the subject?

Mr. Pasco. I have a letter from the Supervising Architect in the committee-room, stating that $32,000 will be sufficient, and upon that estimate the committee reduced the appropriation from $50,000 to $32,000. That report of the Supervising Architect was before the committee when the bill was considered.

Mr. Edmunds. I must say with great respect (not as applying to this particular case, for I know nothing about it) that I am very much afraid we are acting rather rapidly and without due consideration on the subject of public buildings over the United States — as well in the State of Vermont as elsewhere, I will add. I should like to have some definite official information about this possible change, and I should be glad if the Senator would not press the bill at this moment, and get the official papers, as the Senator has them not with him now, wherein it is represented, I have no doubt, as the Senator states, but so that it will go into the *Record* and show exactly upon what grounds it is that the Senate passes the bill.

Mr. Pasco. I should like very much to get the bill through to-day, as certain days have been fixed in the other House for the consideration of bills of this kind, and the building is in an unfinished condition. I should like very much to get the bill through to-day. As proposed to be amended it is in exact accordance with the report of the Supervising Architect.

Mr. Vest. If the Senator from Florida will permit me, I will state to the Senator from Vermont that I happen to know personally the correctness of his statement in regard to the report of the Supervising Architect. We took the matter up in our committee and examined it carefully at the last meeting, and reduced the amount from $50,000 to $32,000 in conformity with that report.

This is one of the most deserving bills of the kind that has been before the Senate. The public building at Pensacola is unfinished and its usefulness is considerably impaired by reason of that fact. A large proportion of the money necessary for the construction of the building has been expended, and this is simply to utilize it.

Mr. Edmunds. How much has the original appropriation been increased altogether?

Mr. Vest. I think this is the first increase of the original appropriation.

Mr. Pasco. This is the first increase of the regular appropriation.

Mr. Edmunds. What was the original appropriation?

Mr. Vest. It was $150,000, if I am not mistaken.

Mr. Pasco. I think that was the amount.

Mr. Edmunds. And this makes $32,000 more.

Mr. Vest. It makes $32,000 more, which is absolutely necessary to complete the building. The Department has expended the money that was appropriated. Pensacola is a very important point, and after this money has been expended nothing will remain to be done.

Mr. Edmunds. Why did not the Department keep within the appropriation?

Mr. Vest. That is one of the questions that it is beyond the ability of any Senator to answer. This thing has occurred over and over again. It has occurred in bills where we have specifically provided that the Department should not expend one dollar beyond the appropriation, and still it was spent.

Mr. Edmunds. When are we to stop it?

Mr. Vest. That is another question of the future. There are a good many questions connected with public buildings in this country. If the Senator will tell me when we are to abandon the present system, then I shall be able to tell him when we can stop it, but I am afraid that it is impossible to go into the question of the public buildings of the country now. The tariff and the Blair bill sink into insignificance when we come to that. [Laughter.]

Mr. Hale. I am afraid the Senator from Missouri is right in estimating the importance of these measures, and I only rise for the purpose of calling the attention of the Senator from Vermont to what the Senate will have to consider very soon, not only upon this bill, but upon dozens, and it may be scores, of others touching the removal of the limit that has been fixed in times past, by deliberation and due consideration, first by committees and then by Congress, upon buildings all over the country.

It has been the fashion to introduce bills and refer them to the proper committee here and in the other body, and fix a limit for the cost of the building, which ought to be the chart followed by the Department in erecting the structure. So far from that being the case, the Committee on Appropriations has before it, referred to it, estimates from the Department covering long lists of public buildings all over the country, estimating for sums beyond the limit already fixed by law.

I do not say that in a given case such a condition may not be inevitable from peculiar circumstances and conditions surrounding the construction of one of these public buildings, but that Congress should proceed deliberately and declare what a building shall cost in one place and another in twenty different cases, and that then the work should proceed deliberately without regard being paid to the limitations fixed by Congress, and we be called upon in an urgent-deficiency bill to make up the sums which it is estimated will be needed to finish the building, is something which ought to be investigated; it is something which ought to be looked into. Otherwise we may as well fix no limits hereafter to any building. Otherwise we may as well understand that we will declare that a building shall be put up in Texas, or in Maine, or in Vermont, or in Minnesota, or California, and that we leave it to the sweet will of the Department and the persons who are urging them to increase the cost and size of the building, and that we will exercise no jurisdiction whatever over the matter.

Mr. Edmunds. And that sweet will is the will of a man who owns property in the place and has charge of the building.

Mr. Hale. Undoubtedly. I hope the Senator from Vermont, in looking into this subject, will not let his efforts stop at this one building, about which I know nothing and against which I have nothing to say. Against the increase of the limit I have no arguments to urge, as I know nothing whatever about it, but I do know the general condition, that we are to be called upon in an urgent-deficiency bill, where Congress has fixed limits, in dozens, perhaps scores of cases, to appropriate more money, perhaps aggregating hundreds of thousands or millions of dollars in this direction. The Senate ought to look to it very carefully before we take any step in this direction.

Mr. Vest. If the Senator will permit me, I do not see the chairman of the Committee on Public Buildings and Grounds present, but I simply want to state that we are now wrestling with this question.

Mr. Hale. With the question of expending beyond the limit of appropriation?

Mr. Vest. With the question of limiting the expenditure. We have before us three bills, and we passed all our time at the last meeting of the committee in considering the propriety of enacting some general measure which would apply to the whole country. The Senator from Kansas (Mr. Plumb) is very much interested in this subject. All I want to say, in justice to the committee, is that our next meeting is called specially with reference to this very matter, and we propose to formulate and bring into the Senate a general bill. It is a very difficult subject. The Postmaster-General dealt in his report very largely with it, and formulated a bill which was introduced at the beginning of this session by the Senator from Wisconsin (Mr. Sawyer). The Senator from Nebraska introduced a bill and the Senator from Kansas introduced one. Out of these three bills we hope to make one which will receive the sanction of the Senate.

Mr. Hale. Are they general bills?

Mr. Vest. It will be a general bill, providing that a public building shall be erected where it is necessary, under the suggestions of the Department, in towns having a certain population. I merely speak generally.

Mr. Hale. With a limitation of classification as to population?

Mr. Vest. We propose to classify them and get rid of this eternal importunity and log-rolling.

Mr. Hale. Such a bill would not get rid of it. We may pass all the general bills in the world and the individual case will still arise where the Department will want more money to complete the building.

Mr. Vest. When such a bill comes before the Senate, it will be possible for the Senator from Maine to turn his intellectual brain in that direction. If he and the Senator from Vermont will bend their

energies and investigation in that direction, for one I shall be exceedingly obliged to them.

Mr. Hale. It would not be of any use.

Mr. Vest. If the Senator will permit me, I will say just a word about my experience upon the Committee on Public Buildings and Grounds, and I personalize him because our relations are exceedingly friendly and have always been so. He wants a public building in the State of Maine, which, by the way, is the best supplied State in the Union in that direction.

Mr. Hale. Then I do not want the public building.

Mr. Vest. There are more public buildings, according to population, in that State than in any other State in the Union. The Senator wants a building in his State. He comes to me and says, perfectly justified by our social relations in doing so, that he is immensely interested in that measure, that, in other words, liberty will lie bleeding in the streets if he does not get it, and he solicits me to do what I can. He gets a report from the Supervising Architect, who says the public service demands it. He has a court there, an internal-revenue office, and, of course, a post-office. It would be churlish in me to say I would oppose his bill, and he knows better, perhaps, than myself — for his public service has been longer — in what a position a member of this or the other branch of Congress puts himself when he poses as a general reformer and obstructor to the expenditure of money for any purpose whatever.

Mr. Hale. Will the Senator let me interrupt him? I am greatly pleased with the imaginative sketch which has been presented by the Senator, and we are all of us pleased with those imaginative sketches of his, but I do not want it to go on record that I am in the position of beseeching the committee to increase an appropriation for a Maine building.

Mr. Vest. Not now. [Laughter.]

Mr. Hale. It happens that the one public building I have in my mind in Maine is perhaps what has called my attention to the subject I have just spoken of. I refer to the public building at the capital of the State, where the appropriation was ample for a large, handsome, suitable building for the business which will be carried on there, and yet there is an estimate for an urgency deficiency for a sum that surprises me, and I do not think it ought to have been sent in. So I am not in the position now of urging the Senator from Missouri to yield his virtue on the committee to my importunity.

Mr. Vest. I know that is the case.

Mr. Dawes. I wish to help the Senator from Missouri with my experience in the matter. If the Senator from Missouri knows, as he is very familiar with this great question, and will tell me how much the post-office building at St. Louis cost, I should like to give him a little history. Did it cost a million or a million and a half dollars?

Mr. Vest. Oh, that was not a circumstance. I think we spent three and a half millions upon it.

Mr. Hale. About five millions.

Mr. Vest. Yes; I could not state the amount accurately, but considerably over $3,000,000.

Mr. Dawes. I was on the committee in the other branch when the persons interested first came to Congress for a new post-office building in St. Louis. They said if they could have the old post-office building and $300,000, it might be bound as firmly as it could be in the law, they never would ask for another penny. Thereupon such a bill was passed. The Supervising Architect of the Treasury went out to St. Louis and they gave him a dinner. At that dinner it was announced that Cincinnati had a post-office building which cost a million and a half, that Chicago had a post-office building which cost six millions, and was St. Louis to be content with a post-office building that cost only $300,000? Not by a good deal, and the Supervising Architect of the Treasury assured them, in the face of the law, that they should have a post-office building equal to that of their rival cities. I understand my friend to say that it cost several million dollars. The law authorizing the post-office at New York had limitation put upon the appropriation as strong as it could be made. When it was commenced, the original act prescribed that it should be completed for a certain sum.

Mr. Beck. For $3,000,000.

Mr. Dawes. For $3,000,000, my friend from Kentucky, who remembers these things a great deal better than I do, says they came back for another million, and it was inserted in the bill at their request, so that they might be sure to have it, that the total cost should not exceed that limit. It exceeded that limit and they came for another appropriation. The same limitation was put in the law, and in the face of it, and with a standing law which makes it unlawful, indictable, impeachable, to exceed the limitations of an appropriation, it has gone on until $6,000,000 or $7,000,000 have been appropriated. The post-office building in Boston has run up into millions in precisely the same way.

Mr. Butler. How many millions?

Mr. Dawes. Three or four millions; I do not know how much.

Mr. Butler. About $9,000,000.

Mr. Dawes. They have never been able to be rewarded quite equal to some of their rival cities, but enough to indict every man who had any connection with the excess of expenditures over the limit of the appropriations. Until somebody is brought up under the law to realize that the law is made to be obeyed by officials, this never will be cured.

Mr. Teller. Is the building any too large now?

Mr. Dawes. It cost too much.

Mr. Call. Mr. President, I desire to say a single word. I have noticed that the spasms of economy always occur in regard to small States with a small representation. Where such a building as the one under consideration will cost $100,000, the great buildings in other States cost millions of dollars. We have passed several bills at this session appropriating more than a million dollars for a public building. I want this talk about economy to be expended upon those buildings and not upon a building of moderate cost, like the one at Pensacola, which the public business imperatively demands.

No one is to blame for this deficiency of $32,000 unless it is the contractor, who has to buy his supplies at varying rates, or the architect. You cannot make a law that the material which enters into a public building shall be the same price and value that it was when the estimate was made for the cost of the building. The architect is not to blame. If any one is to blame, it is Congress who votes the limitation. I do not know how my honorable friend from Missouri is going to pass a bill which will prevent future Congresses from appropriating as much money as they see fit for public buildings. But let that be as it may, it is Congress, it is ourselves, and not the Supervising Architect or the Secretary of the Treasury who are to blame for the extensions of the limit of the appropriations.

I wish to add that Pensacola pays a large amount of revenue to the Government. This building is imperatively demanded. The Supervising Architect certifies the fact that it will not be complete and useful for the purposes for which it was designed without this small amount of money.

Mr. Plumb. Mr. President, I want to indorse very heartily what the Senator from Florida [Mr. Call] has said about the place where economy is applied in legislation. New York got six or seven million dollars for a public building, and I noticed the other day that one newspaper in that city devoted an entire column to the abuse of Congress for the proposed expenditure of $50,000 or $100,000 upon public buildings in different parts of the country remote from New York. The cities get everything they want, without any reference at all to the cost, to the rental value of the buildings, or anything of that kind, and when they obtain it they then very coolly propose to close up the entire subject and have no more public buildings anywhere. It is a wrong tendency. It is a part of a general tendency to carry everything to the large cities at the expense of the country. It is not wholesome, but quite the reverse.

I think that wherever the Government has public business to transact of any magnitude it ought to have its own public building to transact it in, all the more because the absence of a building very often leads the Government, directly or indirectly, into real-estate speculations. The Post-Office Department had an inspector in Kansas during last summer who excited the acquisitiveness of the people living in different parts of towns interested in property, and so on, to bidding for the location of a post-office building, and he succeeded in getting, in places of 4,000 and 5,000 people, persons interested in real estate in certain parts of the town, not only to give the rent for perhaps five years for nothing, or at a merely nominal sum, say a dollar a year, or something of that kind, but to furnish the most elaborate fixtures for the use of the Government. I regard that as an offense. I do not think the Government ought to engage in business of that kind, and yet that is what it is doing. That is the reverse side of the picture which has been drawn here of the extravagance in public buildings in large cities.

But something has been said about the reasons for these deficiencies. Mr. President, it is the old story of a dollar for a dress and ten dollars for the trimmings. Every public building which is put up costs ten times more for superintendence and extras and contingencies than it ought to do. Out of $100,000 appropriated to erect a building, say, out in Kansas, at least $10,000 of that money will be spent before ever a lick is struck. There is the city of Wichita, where the Government has simply a naked lot. There is no more danger of its being carried away than of this Capitol being carried away, and yet it has a watchman and a superintendent, but no man at work.

Mr. Hale. They are watching the land.

Mr. Plumb. Yes, they are watching the land. I do not know but that they are watching the Republican politicians out there. At all events, the watchmen are there and they are getting paid for it. The Senator from West Virginia [Mr. Kenna] says to me that the Republican politicians there need watching. If they do you will have to appoint a great deal more clever people than you have done out there in order to make that watching very effective.

Mr. Kenna. The Senator entirely misunderstood my remark, if he alludes to me. I said there were no other kind of politicians out there to be watched.

Mr. Plumb. I have in my hand the report of the commission for the construction of the Congressional Library building, which has in it some paragraphs which are a sample of that which pertains to the construction of every public building in the United States. It shows that we are getting a large amount of services of architects, a large amount of washing of towels and hiring of coupés and things of that kind, and a very little building. During the last year there have been spent for literally contingent items in no wise represented in the construction over $38,000.

Mr. Hale. On that building?

Mr. Plumb. On that Library building. The Senator from Massachusetts [Mr. Dawes] seeks to identify it by saying that it is

where the hole is. The hole is there, and before it ever assumes the pretense of a construction it will be big enough to carry into it more than the sum of money we intended to appropriate for a building. I will commence on page 14, at the bottom of the page, and read from the report of the Commission for the Construction of the Congressional Library Building:

Office expenses:		
Stationery, draughtsmen's tools, materials and instruments, and printing and binding, etc.		$1,821.15
Office-furniture, drawing-boards, cases, awnings, etc.		2,612.16
Office expenses — Continued.		
Fitting up offices, 145 East Capitol Street		1,954.17
Blue-print room		919.66

It will be noticed that all these sums have accommodating fractions as an affix, which, of course, are supposed in some way to verify them.

Fuel and gas		261.51
Laborer as janitor		573.00

The Senator from Massachusetts [Mr. Dawes] is now seeking to introduce some irrelevant matter here by inquiring what that man is janitor of. He is janitor, I suppose, of what the man out in Wichita is watchman of.

Mr. Kenna. Of the hole in the ground?

Mr. Plumb. Of the hole in the ground. The report continues:

Coupé, two horses (one to replace horse sold, and proceeds covered into Treasury), harness, robe and blankets	$868.00	
Livery bills for carriage and horses, driver, and repairs	540.49	
		$1,408.49
Washing towels,		35.11

It is something to be clean at Government expense.

Notary's Fees		.75
Cleaning windows, putting away fuel		25.30
Lanterns and oil for watchmen		11.25
Making models for architect, labor		216.00
Express and freight		1.08
Miscellaneous supplies		54.07

The items foot up $9,893.80.

Those are all, as will be seen, items with some particularity and some detail. Now we come to some other expenses, in which the clerk-hire apparently gave out, and consequently there are no items at all; they are continued in a lump. This is in the Commissioner's office:

Salaries and pay of office employés:	
In Commissioner's office —	
Secretary, accountant, disbursing agent, and messenger	$5,639.00
In Architect's office —	
Architect, assistant architect, computer, civil engineer, experts, draughtsmen, clerk, messengers, and sculptor	23,200.80

I suppose they are set down in the order of their relative importance and rank. I can readily see how a sculptor would not be necessary for the purpose of executing a hole in the ground, at least not a sculptor of very high degree. These items sum up $23,200.80, making a total for salaries and pay of office employés of all kinds that are mentioned of $28,839.88. In other words, the personal staff, not of a Library building, not of a piece of public work in process of execution, but the personal staff of something that is not being done at all, cost last year $28,839.88. And they had besides, in the way of contingencies, frills, and furbelows, coupés, and things of that sort for their convenience and comfort, $9,893.80, making, as I said, a total of over $38,000, which has been spent without yielding to the Government one single return, except the happy satisfaction we all of us have of seeing a man walking around, well dressed, at the public expense, and knowing that we have contributed to his comfort and convenience and to the general air of well-fedness with which he exhibits himself.

A Senator has handed to me an itemized statement which appears in the Blue Book. Here is the Blue Book itself, which sets forth the names of the different employés under the commission which has been created by law for the purpose of spending the money which we have appropriated to construct a Library building. Sub-titles are put in to indicate the particular employment of the different persons engaged, and under the title of "In charge of horses and carts" I find the following names:

Samuel Brown, District of Columbia —

He was appointed from the District of Columbia; they were all appointed from the District of Columbia, however —

Mrs. Amelia Johnson.	Bartley Thornton.
Mrs. Almyra Burgess.	Daniel Toumey.
Mrs. Mary Liberty.	Mary E. Shearer.
Patrick Powers.	Maurice Talty.

There is nothing recorded there that is very remarkable, but still it is worth pausing to consider that four women are put down as in charge of horses and carts. Of course it may well be that as these women did not have any voting to do, being withdrawn from the discharge of the very onerous public duty of casting a ballot, they have more time to give to the discharge of the very useful duty of taking care of the horses and carts which the commission employs although just what the horses and carts are for of course I do not know. The man who said in a public meeting that he vouched for a certain man was a little disconcerted when somebody stepped up and asked, "Who vouches for you?" I am not vouching for the horses, nor for the carts, nor for the women in charge of them, and I do not care to suggest that some sort of subterfuge has been employed whereby persons are put on the rolls to do one thing, perhaps of a somewhat personal character, while at the same time they are exhibited as performing a public duty.

But it is plain to be seen that we are not going to get anything out of the appropriation of money for a library except a large bill of expense, and I do not speak of this particularly for the purpose of characterizing it alone, but of saying that in the Architect's Office of the Treasury Department will be found the data to show that in substantially all the public buildings already erected by the United States and being erected now a similar condition of things exists, and it is one reason why the Government pays from twenty-five to fifty per cent more for a given result than private parties pay. The moment a public building is provided for, it becomes a sort of hospital for persons who want employment, and long before any contract is made or the Government has got any property to watch or look after, somebody is appointed as a superintendent. It does not make any difference how long the construction may take, the superintendent is like the brook, he goes on forever and forever.

I have been asked who constitute the Library Building Commission. I know that the Secretary of the Interior is *ex-officio* president of the Board; that it consists of an architect, who drew the plans, and of the Architect of the Capitol, certainly. I do not know who else.

Mr. Butler. And the Librarian of Congress.

Mr. Plumb. Yes, the Librarian of Congress. There being two architects on the Board, of course they do not agree, except presumably in regard to the expenditure of the money, and of course, therefore, there has grown up all sorts of trouble, one pulling one way and one the other, and nobody at hand to put the casting ballot on one side or the other, and the result is, probably what was designed, a simple wasting of the public money, a nursing of that building in order to give employment to the end of time. Certainly there is in that commission, so far as the majority of it is concerned, no honest purpose to complete the building within the contemplation of the Act of Congress.

I do not say where the responsibility should rest for that condition of things, because I do not know, but the majority, which has the power to resolve all these things in favor of prompt, active work of construction, has not chosen to do so; but, on the other hand, there is a great expenditure for employés entirely unnecessary, for contingent expenses which are extravagant when no work of construction is going on, and that is a sample of the way the public business of the country is transacted to a very large extent in regard to public buildings. The money which has been wasted in this way would have supplied to every town of 25,000 people in the United States a building large enough for the transaction of the public business; it would have enabled the Government to have in all these cities and towns an abiding place, some place where its jurisdiction was supreme, some place where its public business could be transacted to-day and to-morrow and for all time, and a guaranty that the Government itself would not be, either actively or negatively, wilfully or ignorantly a party to real-estate speculations.

Mr. Stewart. Mr. President, I am glad there has been a statement of the transactions to which allusion has been made, and I think from conversation with the architect there is certainly reform needed. In my town an appropriation was made some years ago of $100,000 for a public building. They hardly got started when $20,000 had been spent with only a fence around the lot and the expense going on. This occurred under a former administration of the bureau, and I am very much in hopes and I believe that the present incumbent will try to make a thorough reform and go on with the business properly and erect the buildings with the money, which, as I understand, was not done in the case to which I refer until one-fifth of the approportion was spent.

Mr. Edmunds. When was the appropriation made?

Mr. Stewart. I do not remember the exact date, but three or four years ago. They had a great deal of trouble in getting a location, but finally they got one that was satisfactory to the Department, but it cost ten or twelve thousand dollars, and eight or ten thousand dollars more had been spent in preliminaries, such as a high fence, a superintendent, and so on.

I am quite confident that the present Supervising Architect is going on with the work, and that he will have reform generally in this business. If he does not, we shall all have reason to complain. I would not like to have reflections cast upon a man just coming in with good intentions and making effort to do what is right. Give him a chance. A distinction ought to be drawn between the man who has failed and the man who has come in with the intention of doing right, as I think the present Supervising Architect intends to do.

Mr. Vest. I have no disposition to retard the passage of the Bill of the Senator from Florida, because, as I said before, it is a deserving measure and ought to be passed; but I noticed in this debate the Senators who have engaged in it have undertaken to state the difficulties under which we have suffered, but none seem to have pointed out the radical defect in the system under which we have constructed public buildings.

Mr. Stewart. The Senator will excuse mè. I meant to remark before I sat down that I believe the appropriation in this Bill is a necessary appropriation under the circumstances, and I shall vote for it cheerfully.

Mr. Vest. In the first place the same trouble exists in regard to the construction of public buildings that we encounter in the Indian service. We have heard for years the question asked, why is it that the Indian service of this country is in its present condition? Why is it that thousands and thousands of dollars are expended by Congress and the Indians are no better off, and the country is no better

off? And the same evils exist and will exist as long as this system continues. The truth is, we expect too much first-class service for the lowest possible amount of money. We send a man to take charge of a tribe of Indians, and pay him a thousand dollars, $1,200, or $1,500 a year. He is expected to control human beings; he is expected to perform the most delicate and responsible functions that can be given to any human being — the control of others as to their life and habits — and yet we pay a thousand or $1,200 a year; and a man is expected to leave civilization and endure the hardships of the frontier and associations with savages, to give up all that makes life worth anything for a miserable pittance that he would ask any clerk to give his services to the Government for here or anywhere else.

We expect to get a first-class architect for $3,500 a year. Why, sir, there is not an architect in the city where I live, who is worthy the name, who is not making from ten to fifteen or twenty thousand dollars a year. I undertake to say in the city of Washington to-day there are half a dozen architects making over $10,000 a year. I asked a gentleman the other day, one of my colleagues in the Senate, who recently constructed a large building, an eleemosynary institution, what amount he had paid the architect. He said $15,000 — nearly five times the salary in one year that we give to our public architect for a year's service. However worthy the present incumbent may be, it is perfectly absurd to suppose we can secure the services of a man competent to take charge of the public buildings of the United States for any such salary.

Then, again, that is not all the trouble. We have this miserable system of day's work. We give a premium to every man, contractor, architect, workman, down to the laborers on the public buildings, to continue the work just as long as possible. The first step when we pass a bill appropriating money for a public building is to send an architect there, and he employs two watchmen and a clerk, and has a model-room and all the paraphernalia of a large business.

Mr. Edmunds. And a local superintendent.

Mr. Vest. And a local superintendent. The salaries go on, and when the building is finished those fellows are out of work. We put a premium upon delay; we have done it for years.

The Senator from Massachusetts spoke of the public building at Chicago. There is a building that went on for years and cost four times what Congress originally intended, and now it is ready to fall down, condemned by the grand jury as a public nuisance, and the evidence in regard to the construction of that building is, I will not say horrible, it is the most disgusting that ever was printed on any public subject in the United States. I have not read it for some time — I have it somewhere among my papers — but it showed that they absolutely organized laborers upon the public buildings so as to cheat the superintendent. They had a society organized, and when the men would be down playing cards, gambling, there were watchmen out to give notice of the approach of the superintendent and the game was broken up, and when he arrived there every man was at work, and the minute his back was turned every man was gambling again.

Mr. President, as long as this system continues we may expect exactly what is the condition of the country to-day. Two years ago the Committee on Public Building and Grounds reported a bill to do away with this system and to put it under contract and let the public buildings of the country be constructed as any private gentlemen would construct his residence. There is not a Senator on this floor to-day if he was about to construct a residence in the city of Washington, who would not call upon architects for their plans and specifications, and then take bonds of a contractor for the erection of the building according to those plans and specifications in a given time.

Mr. Edmunds. And within a given price.

Mr. Vest. And a given price. And if it were not completed the forfeiture would be exacted on the bond. And yet what do we do in regard to the money of the people of the United States put in these public buildings? We take no bond. There is a little paper here in the city of Washington, as big as my two hands, or was here — I have not seen it lately — which lives upon the advertisements from the Treasury Department for public buildings.

When a bill was passed in Congress for the construction of a building in Missouri the bids were put out for the different sorts of work in this little paper. A ring was here in the capital and this work was confined to that ring, and no man received one dollar who was not in it. It was upon the face of the statute-book the duty of the Secretary of the Treasury to supervise these contracts, but as a matter of course they went to the Supervising Architect's Office, as a matter of routine, and the Secretary of the Treasury knew no more about them than any Senator in this body.

Does any one wonder that public architects went out of this city almost millionaires who came here paupers? Is it any wonder that a few years ago the newspapers of the country were filled with the scandal in regard to the public architect's office that threw one man out of office and implicated several others? All these things have taken place, and they will take place until we reorganize the whole system under which the public buildings are constructed. The bill to which I referred was reported two years ago and received no more attention from Congress than a piece of blank paper. Nobody cared anything about it, but on the other hand — and I do not put myself on a pedestal to lecture my brother Senators — in the rush to have public buildings constructed in different localities, the general law was permitted to die, and it amounted to nothing.

Mr. Edmunds. What did that general law provide in substance?

Mr. Vest. It provided that when a public building was to be constructed bids for the work should be advertised in the newspapers having the largest circulation in the city and vicinity where the building was to be constructed; that those bids made by responsible persons should be submitted to the Secretary of the Treasury and the Secretary of War and the Secretary of the Interior; that they should meet and pass upon the bids, and when they awarded them to the lowest responsible bidder he should then give bond with approved security for the construction of the work within a certain time at a certain price. In my opinion we shall never be able to do away with the abuses that exist until that bill or some similar measure is enacted. As we are now proceeding there can be no reform.

I make these remarks with no political significance at all. I say that the business of the people of the United States should be conducted upon business principles; and there is not one Senator here to-day who would for a single moment think of applying the system that now prevails in this country to his own private business.

Mr. Hale. Mr. President, it strikes me that there is a good deal of force in what the Senator from Missouri has observed in reference to the inadequate compensation the Government pays to the officers who have this great business of the public buildings in charge. The pay is not commensurate with the importance of the place; of that there can be no doubt. And yet bright and competent architects are always very well pleased to be connected with this work, and especially to hold the position of Supervising Architect of the Treasury, under which most of this work is done. The enlarged experience, the broad acquaintance that is made, and the reputation that may naturally follow a man's successful course in this office, give him a great advantage when he leaves the office and returns to the field of private competition; and the history of this office has been for years that the men who have left it have gone into their old vocation in private life benefited undoubtedly by this experience. So that is to a degree an offset against the poor pay that we give them.

What I wish especially to call attention to — because, as I said before, the Senate has got to meet it — is the call that is made upon us now from the Supervising Architect's Office and from the Treasury Department for money appropriations in excess of the limit heretofore fixed by Congress. For this I do not blame the present Architect. I have had but little business to do with him since he came in, and that business has impressed me favorably with him personally. But for the first time Congress is confronted with this condition in regard to the public buildings throughout the country. Everybody knows that for years past as a building in a particular place neared its completion its friends and the representatives of the community where it is being built appear in Congress, either in the other branch or here, and seek to remove the limit and to get an increased appropriation; but it is only of late that the Department itself having charge of this work, limited by the decree of Congress in fixing the limitation on the several buildings, has adopted as an estimate of an actual deficiency for the current year the claims that are set up for increased expenditure.

The advocates of the buildings, the Representatives of the districts or the Senators from the States, are not left as heretofore to fight it out on the floor of either the one House or the other in Congress and get their increase if they can, but the Department, disregarding the limitation fixed by law, has adopted these estimates for deficiencies.

I hold here now a document which is headed, not "ordinary deficiencies," but "urgent deficiencies," deficiencies that press, deficiencies that must needs be inevitable, upon which speedy attention is demanded, and the heading, further, of the estimates is in this language:

Estimates of deficiencies in appropriations required to meet urgent demands of the Government for the fiscal year 1888, and for prior years —

Not to be embraced in the general-deficiency appropriation bill, where we have formerly put such items, if put at all, but in the urgent-deficiency bill that hangs as a menace over Congress, that if it does not promptly treat the subjects that are called for in this document great harm will result to the public service; and here are the items on the subject about which we are talking; I will read them in alphabetical order:

Auburn N. Y.: Post-office, Court-house, etc. —
For completion, in excess of the limit $30,000

Mr. Edmunds. Where do those estimates come from?

Mr. Hale. From the Treasury Department, and sent down with this heading, indicating that they are urgent, not ordinary deficiencies.

Augusta, Me. —

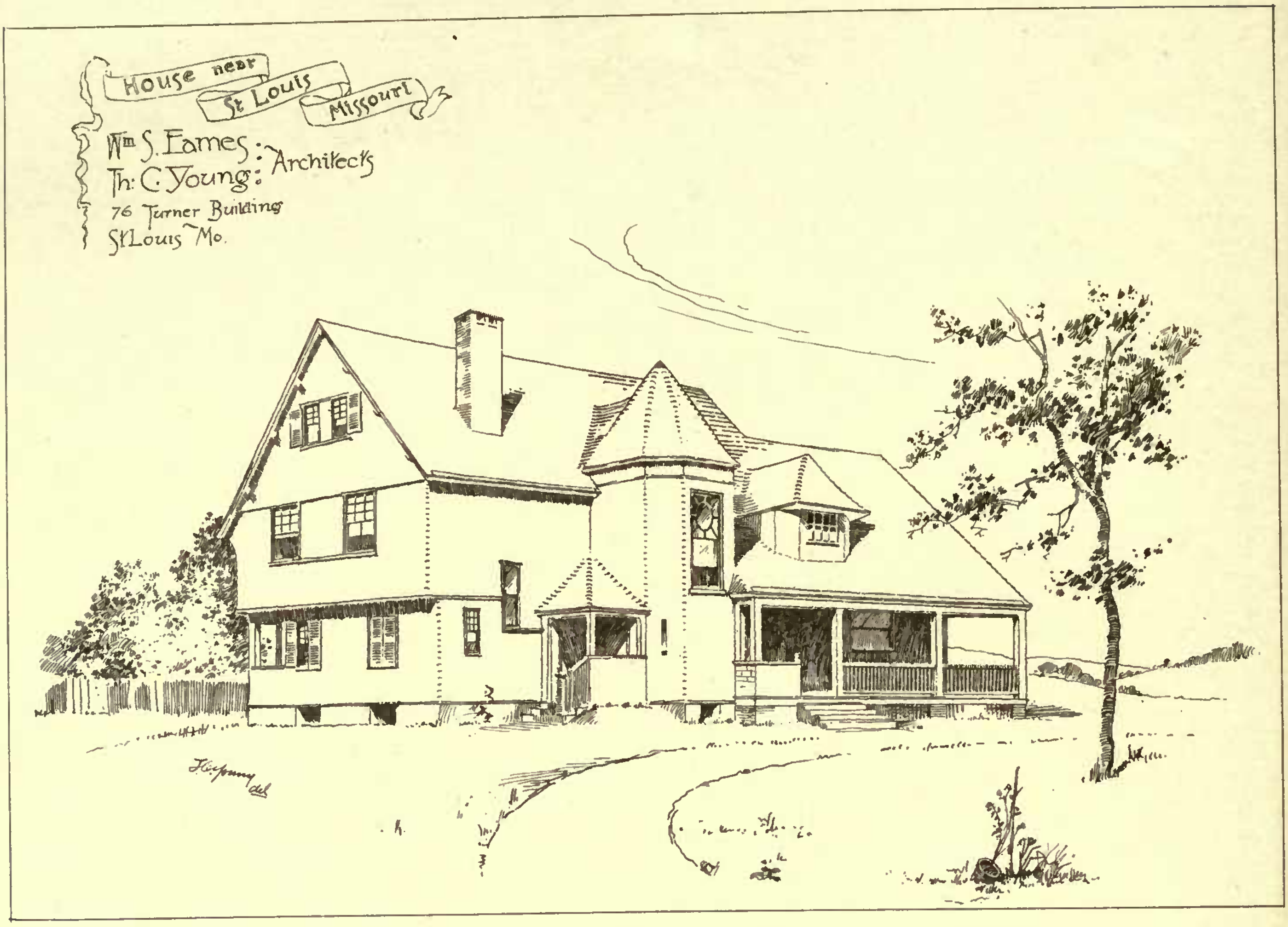
The building to which I before referred.

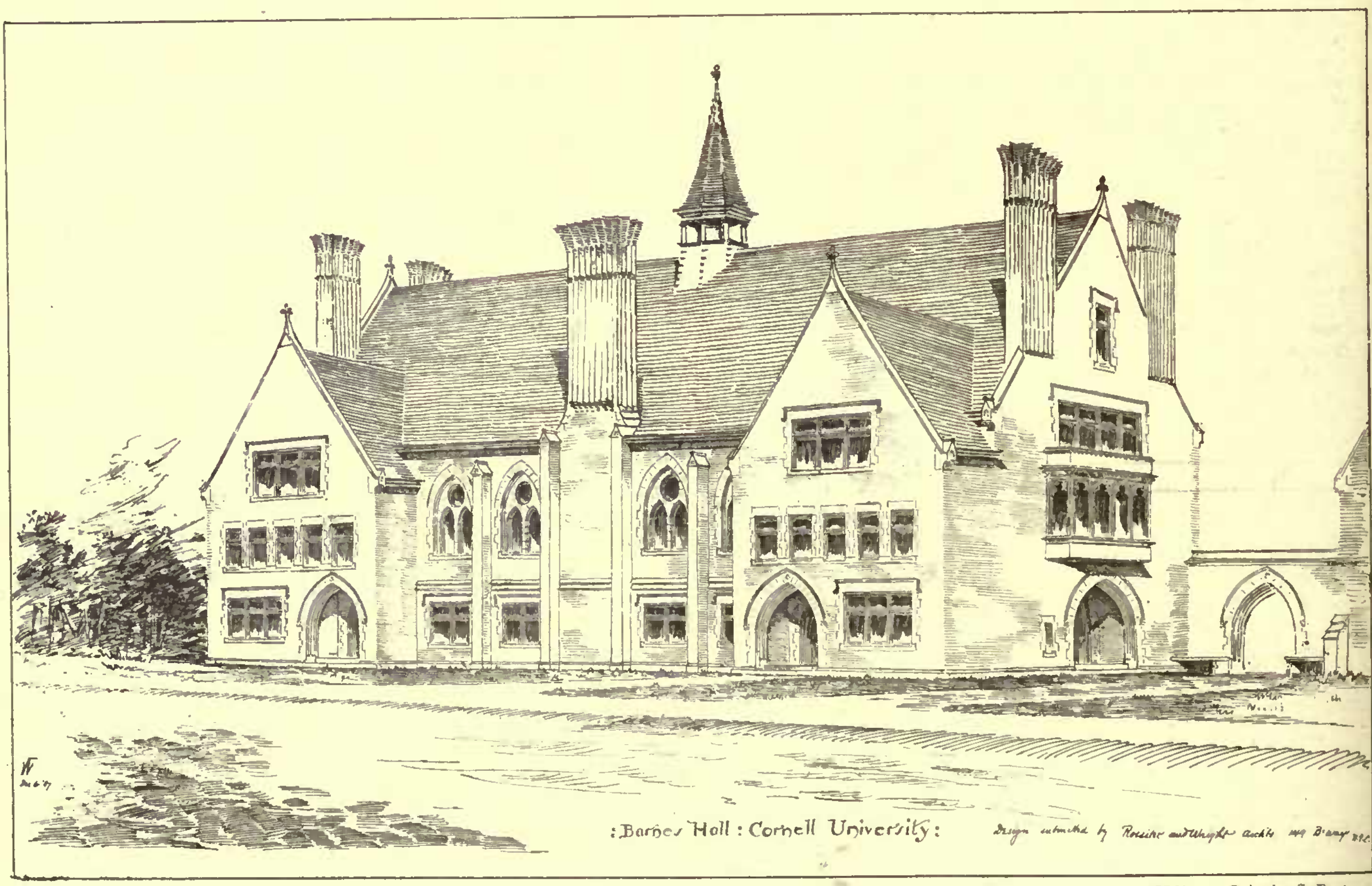
Augusta, Me.: Post-office, Court-house, etc. —
For completion, in excess of the limit.... .... $35,000

Whenever that is reached upon any appropriation bill, I shall have something to say as to the reasons that have caused this deficit in that appropriation, this request for $35,000 more money than was originally appropriated, when all that was asked for was given.

Buffalo, N. Y.: Custom-house and Post-office —
For completion, in excess of the limit.......................... $500
Carson City, Nev.: Court-house, Post-office, etc. —
For completion, in excess of the limit.......................... 36,000
Charleston, S. C.: Custom-house wharf —
For extension and completion, in excess of the limit.......... 138,000
Concord, N. H.: Post-office, Court-house, etc. —
For completion, in excess of the limit.......................... 11,000
Dallas, Tex.: Court-house, Post-office, etc. —
For completion, in excess of the limit........ 11,000

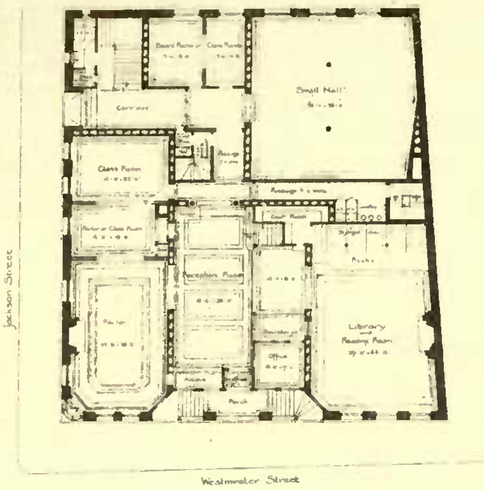
COPYRIGHT 1888 BY TICKNOR & CO





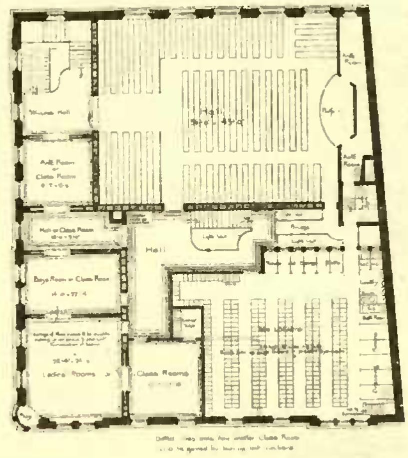
Heliotype Printing Co. Boston.

COPYRIGHT 1888 BY TICKNOR & Co



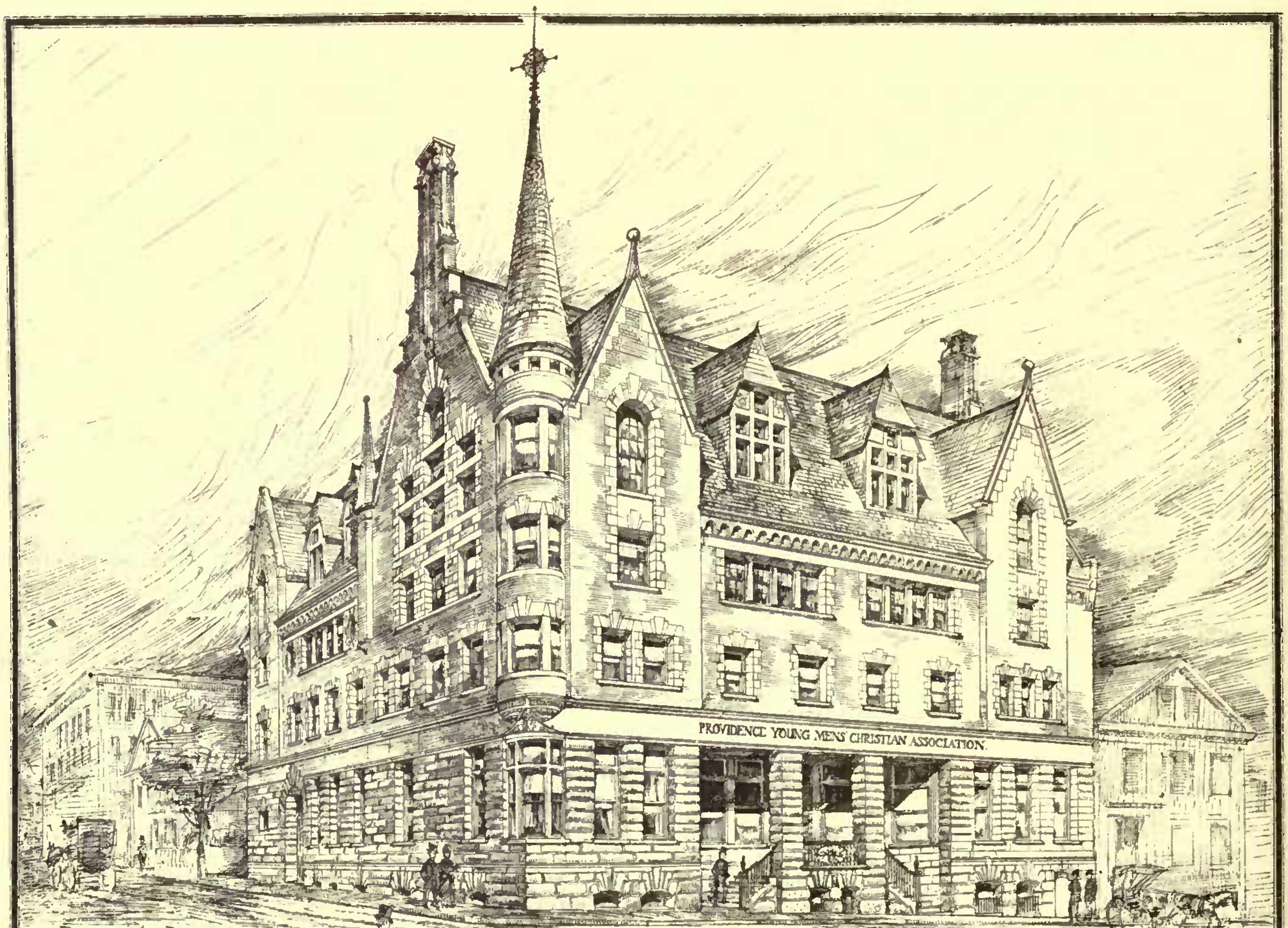
First Story Plan.
Scale 1/8 inch 1 foot

Sketch Plans of a Building
for the
Providence
Young Men's Christian Association.
October — 1887



Second Story Plan
Scale 1/8 inch = 1 foot.

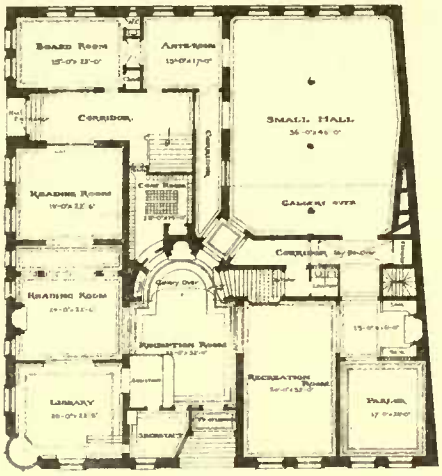
Sketch Plans of a Building
for the
Providence
Young Men's Christian Association.
October — 1887.



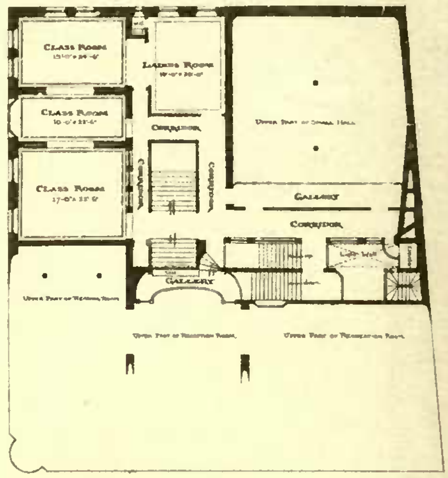
Design of a Building for the
Young Men's Christian Association
Cor. Westminster and Jackson Streets
Providence, R. I.
October 1887.

Heliotype Printing Co. Boston.

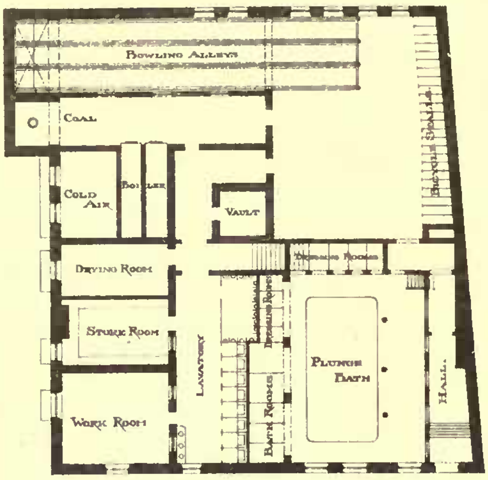
American Architect an[d]
Copyright 188



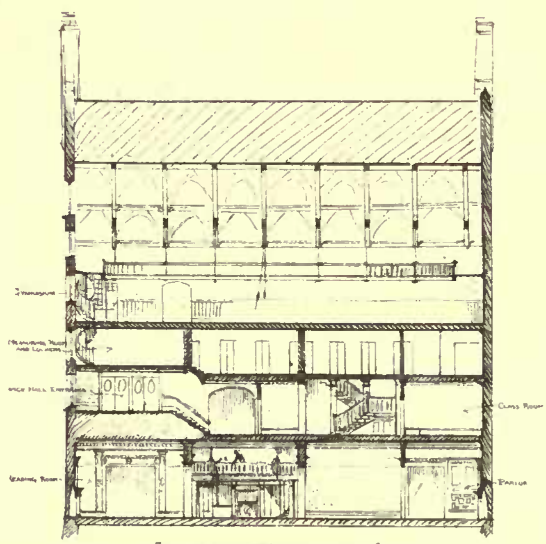
First Floor



Half Story



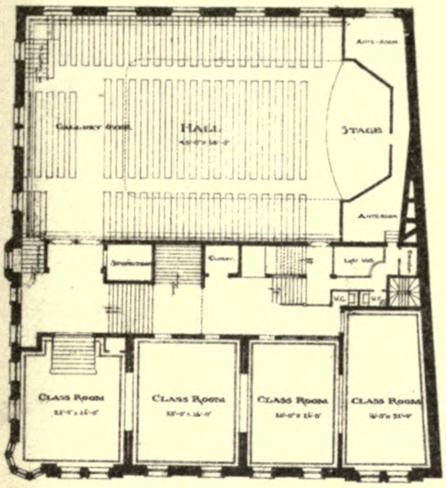
Basement



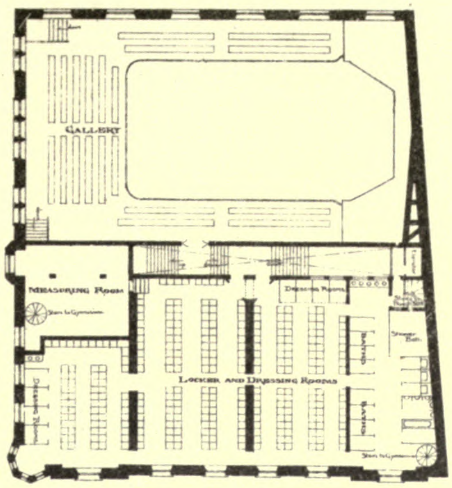
Section [illegible] Westminster St

Plans of Propose[d]
Providence Young Men[']s
As Amended from A
Stone, Carpenter and Wills[o]n

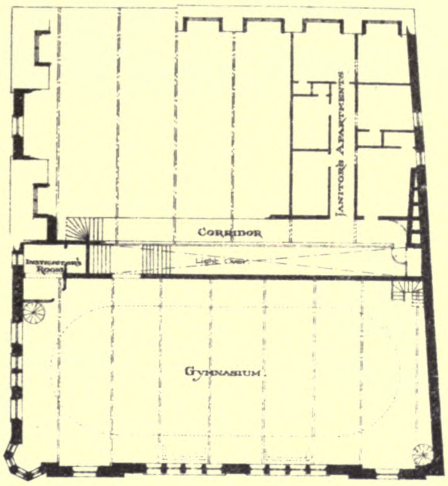
NOR & Co



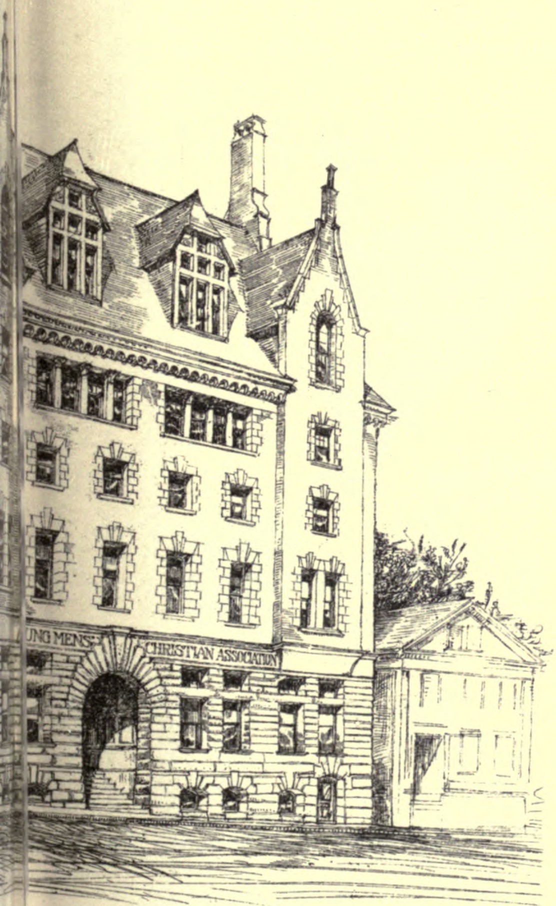
SECOND FLOOR

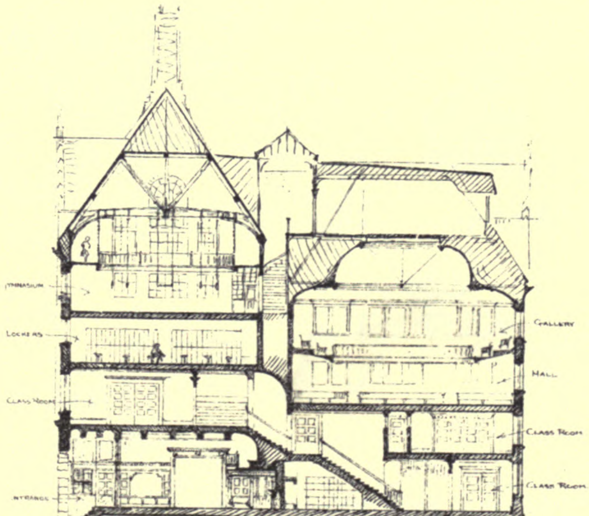


THIRD FLOOR



FOURTH FLOOR



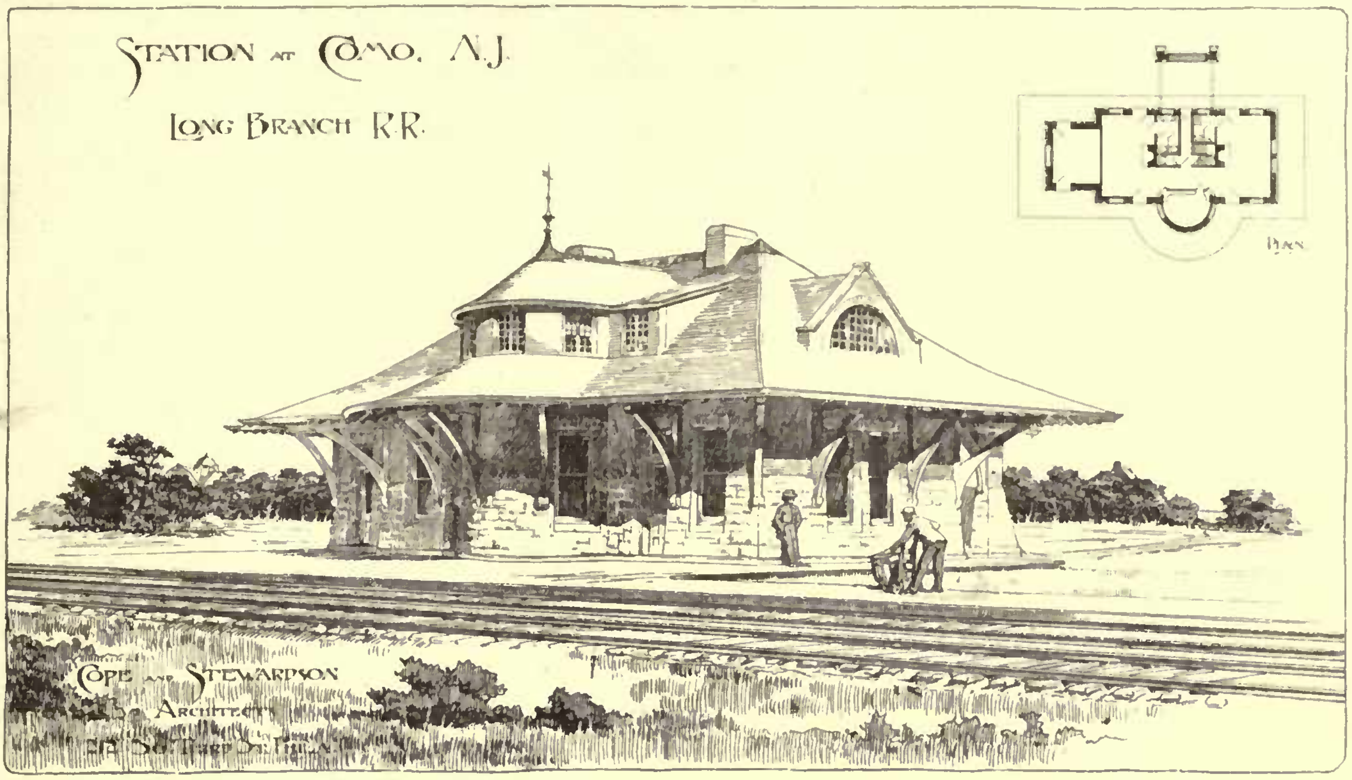


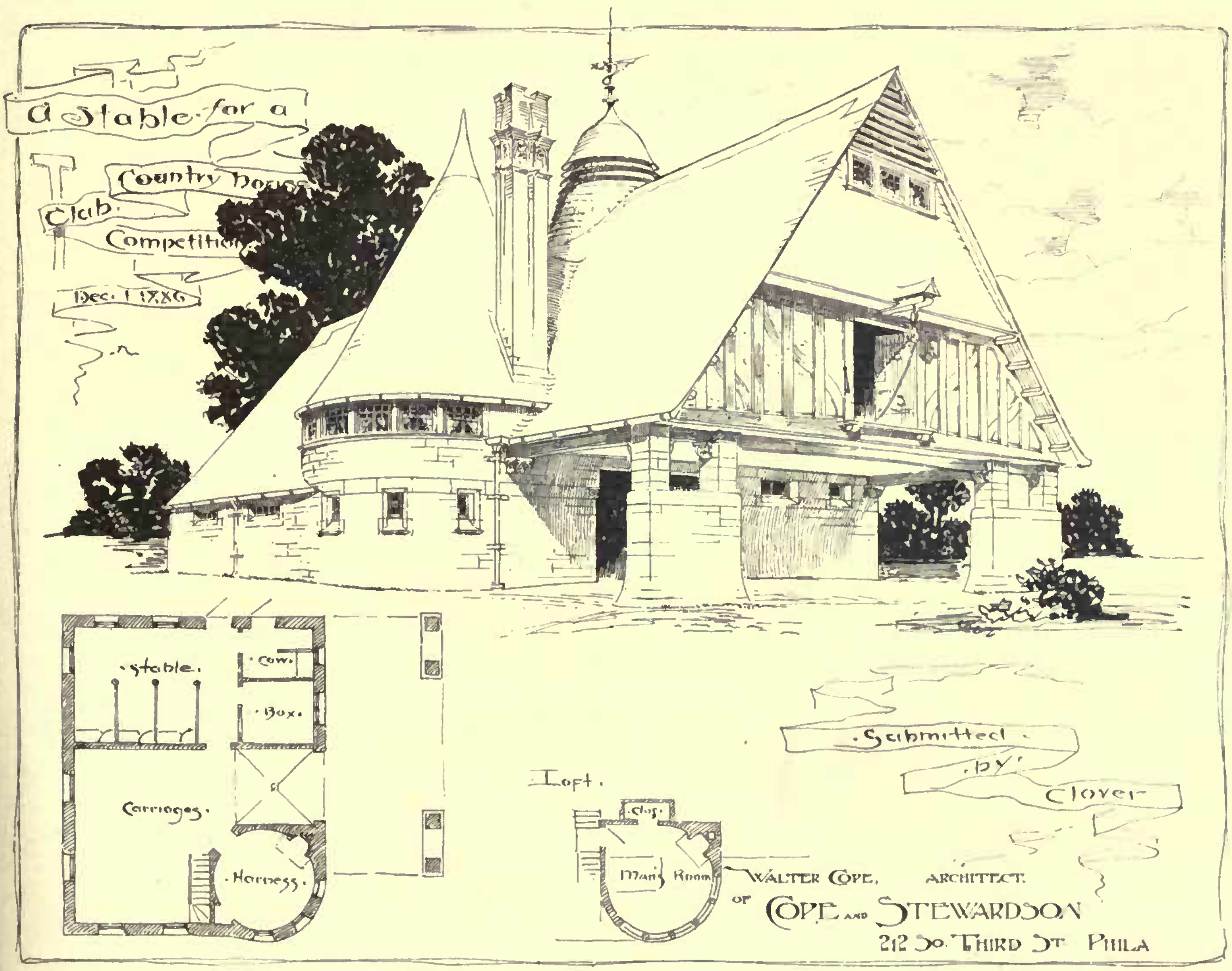
SECTION parallel to JACKSON ST.

UILDING · FOR · THE ·
CHRISTIAN · ASSOCIATION ·
cepted · Design ·
ARCHITECTS 65 WESTMINSTER ST., PROVIDENCE, R.I.

Heliotype Printing Co. Boston.

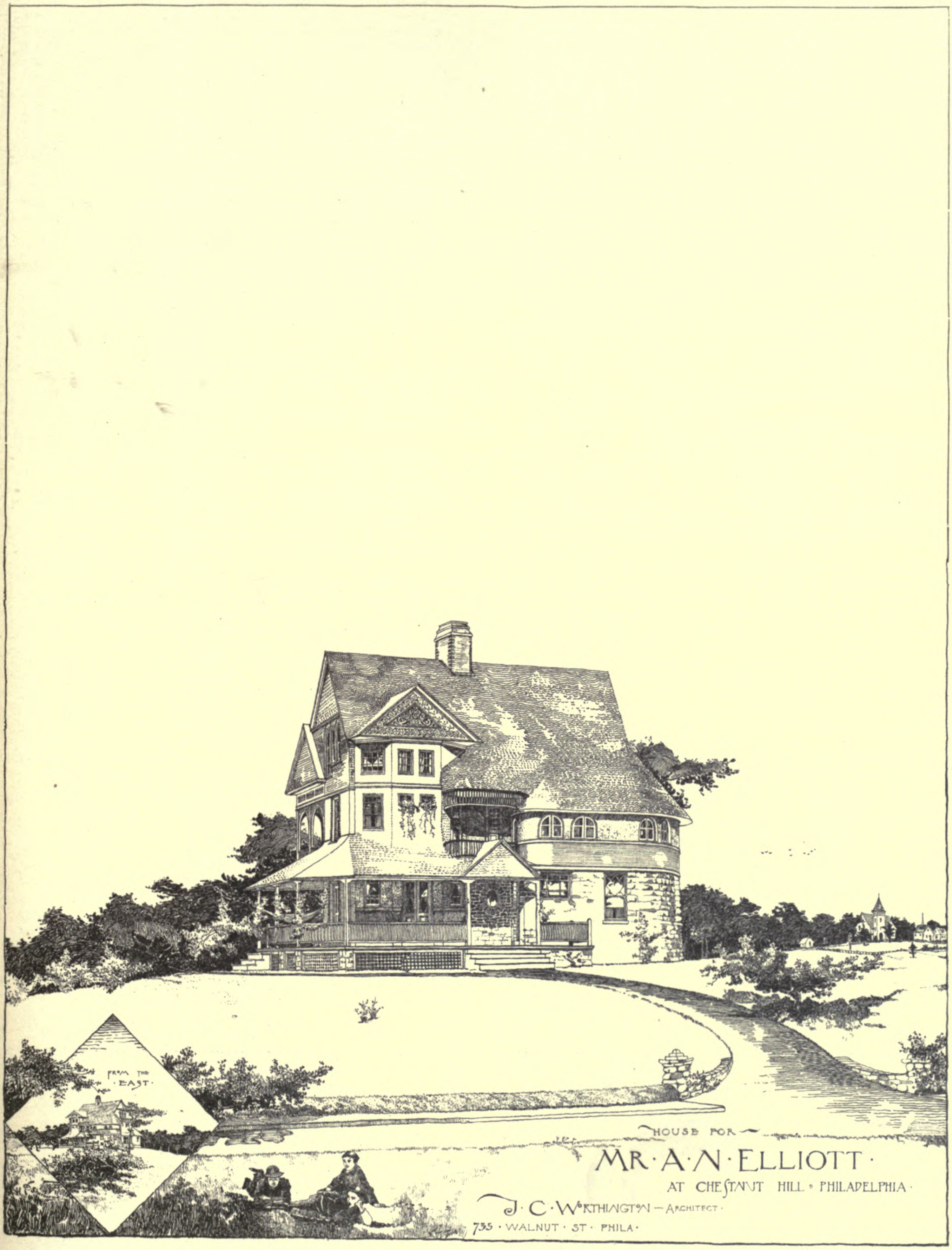
COPYRIGHT 1888 BY TICKNOR & Co





Heliotype Printing Co. Boston

COPYRIGHT 1888 BY TICKNOR & Co



Heliotype Printing Co. Boston

Denver, Col.: Court-house, Post-office, etc. —
For extension and completion, in excess of the limit.......... $60,000
Fort Wayne, Ind.: Court-house, Post-office, etc. —
For completion, in excess of the limit........................ 16,000
Hannibal, Mo.: Post-office, etc. —
For completion, in excess of the limit........................ 2,000

Mr. Beck. While the Senator is going on with that, as I am not well enough advised about it, I ask him whether many of those things do not arise from the fact that under previous contracts, until a new ruling by Secretary Fairchild, the house was considered completed when the building was roofed, or regardless of the approaches. Those old contracts were made on that basis, and the building was called complete when the work on it was done. A late ruling requires that the approaches shall all be embraced and made part of the contract, and, therefore, under the late ruling, whenever a building was finished and the heating apparatus and the approaches are not completed, there would be a deficiency. Is not that the case?

Mr. Hale. I happen to know about that. In small sums that is true, and the decision undoubtedly in such cases has helped to swell this estimate, but it only applies in a limited amount. For instance ——

Mr. Beck. One more suggestion and I am done. Perhaps we shall get some good out of this talk when we come to regulating the matter hereafter. Is it not the fact when a force is employed of watchmen, clerks, messengers, and I do not know what they call them, that they are always paid and kept under pay until the last brick in the pavement is laid all around, and all the approaches are finished?

Mr. Hale. Undoubtedly.

Mr. Beck. That has been stopped, has it not?

Mr. Hale. All of this is an old practice, but never so great, I think, as at present in its abuse; but still it is an old practice, coming down somewhat from the past, and in estimating what the limit shall be originally in the architect's office, which limitation Congress accepts, all of these things are included.

Now, the consideration about heating apparatus, approaches, etc., which are held under the decision of the Treasury to swell the cost, only applies in a small degree, and it cannot apply excepting in the case of a building nearly completed. In the case of the building at Augusta, Me., where it is only just begun, it has already been found that under the management, or mismanagement, there, they are $35,000 short, and in addition to that they have another estimate in for fireproofing the building.

In addition to that, which I did not read, take the work at Charleston, $138,000. That is not in any way increased, or to any material extent, by the consideration suggested by the Senator from Kentucky. No, it is the deliberate adoption on the part of the Department of this cry for more money over and above the limit fixed for the building, when I think it would have been better administration if the Department had said, "Congress has given us a rule in these buildings; Congress has fixed a limit; if Congress removes the limit, then we will estimate as to what more is needed to complete the buildings"; but I do complain that Congress is called upon now by the Department as an urgent deficiency to increase these items. Let me continue reading:

Jackson, Tenn.: Court-house, Post-office, etc. —
For completion, in excess of the limit........................ $ 1,000
Keokuk, Iowa: Court-house, Post-office, etc. —
For completion, in excess of the limit........................ 15,000
Leavenworth, Kans.: Court-house, Post-office, etc. —
For completion, in excess of the limit........................ 3,000
Lynchburgh, Va.: Court-house, Post-office, etc. —
For completion, in excess of the limit........................ 2,000
Manchester, N. H.: Post-office, Court-house, etc. —
For fireproofing and completion, in excess of the limit........ 46,000
Montpelier, Vt.: Post-office Court-house, etc. —
For completion, in excess of the limit........................ 20,000

I am informed that in the latter case, where it is already settled by the Department that the limit is to be exceeded, hardly a stone or brick has been laid.

Pensacola, Fla.: Court-house, Post-office, etc. —
For completion, in excess of the limit........................ $ 2,000
Port Townsend, Wash.: Custom-house, Post-office, etc. —
For completion, in excess of the limit........................ 38,000
Poughkeepsie, N. Y.: Post-office, etc. —
For completion, in excess of the limit........................ 500
Richmond Va.: Custom-house, etc. —
For completion, in excess of the limit........................ 33,000
Rochester, N. Y.; Court-house, Post-office, etc. —
For fireproofing and completion, in excess of the limit........ 50,000
Shreveport, La.: Post-office, Court-house, etc. —
For plumbing and completion, in excess of the limit........... 2,000
Springfield, Ohio: Post-office, etc. —
For completion, in excess of the limit........................ 15,000
Syracuse, N. Y.: Post-office, Court-house, etc. —
For extension, granite-work for approaches, and completion, in excess of the limit........................ 65,000
Terre Haute, Ind: Post-office, etc. —
For completion, in excess of the limit........................ 32,000
Toledo, Ohio: Custom-house, Court-house, etc.: —
For completion, in excess of the limit........................ 17,000

And the aggregate is $796,500 in an urgent-deficiency estimate. What the conditions are that have changed from the conditions of the past that should justify this urgent demand upon Congress to change what is substantially the law in twenty or thirty different cases, enacted by Congress, I fail to see. That there has been solicitation most abundant and overpowering before the Department I can well conceive; but, as I have said before, it occurs to me that it would have been better administration if the Treasury Department had said, "There is the written law; there is the statute enacted by Congress that authorizes the building of this structure, and until Congress declares that the limit fixed therein shall be exceeded or changed the Department administering the law passed by Congress will not step one foot beyond the boundary of that law. Get your limitation increased by Congress, gentlemen, and then the Department will estimate the cost upon plans that it will submit."

I hope, Mr. President, that this is not an adoption of a new rule of action in the Department under which, at the beginning of every session of Congress, we shall have claims put in here, or estimates made here for what are called urgent deficiencies of this kind, and the subject to me is so important that I have been glad that the Senator from Vermont has raised the question upon this Bill which, as I have said, I know but little, or nothing in fact, about, in order that these facts might be presented.

Mr. Teller. Mr. President ——

Mr. Morrill. Will the Senator from Colorado, before he proceeds, allow me to read the phraseology which has been inflexibly adopted by the Committee on Public Buildings and Grounds in relation to all of these buildings which have been authorized. I read from a Bill that was passed last session for Springfield, Mass.:

That the Secretary of the Treasury be, and he is hereby, authorized and directed to purchase a site for, and cause to be erected thereon, a suitable building, with fire-proof vaults therein, for the accommodation of the United States post-office, internal-revenue office, and other government offices, at the city of Springfield, Mass. The plans, specifications, and full estimates for said building shall be previously made and approved according to law, and shall not exceed for the site and building complete the sum of $150,000.

That is the precise formula that has been adopted for years, and so far as the Committee on Public Buildings and Grounds are concerned they have made the law as stringent as possible.

Mr. Hale. And was it not the expectation in this case as in every other that the building when completed should be confined to the limit fixed by the committee and then by Congress.

Mr. Morrill. Of course it was.

Mr. Edmunds. And put in working operation.

Mr. Spooner. I should like to say, by way of supplementing what has been said by the Senator from Vermont [Mr. Morrill], that in the bills which have been reported by the Committee on Public Buildings and Grounds at this session we have incorporated a provision that the erection of the building shall not be commenced until the plans have been completed and approved according to law, and the estimates fully made and submitted and approved upon the basis fixed in the law.

Mr. Teller. Mr. President, several years ago, I should say at least six years ago, perhaps seven, Congress appropriated $300,000 for a public building at Denver. That was a very small sum for a place that promises as much as Denver. From the time the appropriation was made to the time that the building had got up to the level of the street, which was somewhere in the neighborhood of two or three years — I do not remember just exactly what — the population of the city had doubled, and before they ever get the roof on, if they should ever succeed in doing so — and that is let by contract and not being done by day's work — or even before they get the joists in the first story, there will be three times as many people in Denver as when Congress passed the law.

After the bill had been passed and the plans had been prepared and the building had been laid out on the ground and the cellar dug, or the basement, or whatever it is, and the United States officials began to look at the size of the rooms, they discovered that they were ridiculously small and entirely inadequate to the business. Thereupon at the last session of Congress the limit was raised from $300,000 to $575,000, and preparation was made for the enlargement of the building correspondingly. This could be done at that time without any waste of money, except the waste that might be incurred in having the watchman, etc., who are spoken of. The basement walls were so thick that they could be increased without adding materially to the expense, without taking them up, and they were left there: so that there was practically no expense. After all this it was discovered that the building was still not large enough. It is a notorious fact that Denver is full of people, and the post-office establishment is in a very small room, crowded with people, who stand around waiting for their turn to get into line, and the post-office officials declare that the building will be entirely inadequate for the increased amount of business. I will not undertake to state here now what the business of the Denver post office is, but it is at least three times that of any city of equal size in any of the New England States.

Mr. Edmunds. What is the population now?

Mr. Teller. Seventy-five thousand, probably; and you can readily see how that is. In the first place you have a system that enables our wives and daughters in Colorado to send to New York and New England to buy their dry-goods and have them sent by mail. They do that. Then the city is always full of strangers, who go to the office for their mail. As I say, men stand for hours now sometimes to get to the window that they may get their mail. So, of course, there is necessity for more room, as the officials say.

It is the suggestion of the Department that in the rear of the building now being constructed on the main travelled street of the city we can extend it for $60,000, so as to add to the area of the building on the first floor 28 feet by 110. That will cost $60,000, and that will make an efficient and valuable post-office; and without it they will have a post-office that never will be large enough for the town.

But is there not some fault here when we commence so inadequate a structure for a town like Denver that everybody knows, who has given the least attention to settlements in that country, must be a

great town some day — 600 miles from any public building, 600 miles from where the Government had ever put a dollar for the benefit of the people of that western country, and the only building you put in Colorado except the penitentiary that you erected for the Territory some years ago for the moderate sum of $28,000, which ultimately, of course, fell to the State.

I say that the appropriation of $575,000, with $60,000 added, is not an improper appropriation for the city of Denver. It is not now what it ought to be by three or four hundred thousand dollars, and no money will be wasted by this appropriation, and none has been wasted there. It is standing there without anything having been done with it, because last year the enormous appropriation was made for that building of $25,000, and it was so small that the contractors declined to go on, as they ought to have declined.

Mr. Hale. Why did you not get more?

Mr. Teller. I had more appropriated in the Bill, but when it got into one of the conference committees, that no man living outside the committees ever understood the intricacies of, it was juggled out in some way [laughter], and instead of coming out $115,000, it came out $25,000. I was not astute enough to discover it until several months after the Bill had become a law, neither was my colleague, nor was the gentleman who represented the State at the other end of the Capitol. We did not discover it until it was too late. So there it stood, and it will not be any special credit to the Government when it is built. There will be plenty of private buildings in the city of Denver that cost more money, that are of more value, and are more imposing in structure and better adapted to the purposes for which they were built than this, and the Government of the United States will, undoubtedly, when it has got this building, be the most poorly furnished of all those doing business in that great city.

Mr. Hale. Now, will the Senator allow me?

Mr. Teller. Certainly.

Mr. Hale. He is furnishing a complete illustration of the evils that I have been complaining of. Granted that Denver is entitled to and should have for a public building a structure that costs not only five, or six, or eight hundred thousand dollars, the Senator has named so good a case showing that the limit should be increased that had it been presented to Congress which fixed the limit, and not to the Department, he would have had no trouble in securing an extension of the limit.

What I complain of is, that after Congress has once increased the limit of a building like this, or in this case, then the Secretary goes on, and, as an urgent deficiency, calls upon Congress to appropriate $60,000 additional. That the money may be needed there on that work after Congress shall have passed upon it, I do not question; but it is beginning at the wrong end; it is putting the cart before the horse. Congress should pass upon these questions. If it pretends to fix limits it ought to unfix limits, and nobody else ought to do it. I do not make any question about the situation in Denver.

Mr. Teller. I am inclined to agree with the suggestion of the Senator, which implies at least that when my bill gets here he is going to vote for it; but I have had some experience in this body, and have had some experience with raising the limit of this building, and I know how difficult it was to get it from $300,000 to $575,000. I knew I could not get the limit raised any higher unless I got the approval of the Department, and I went to the Department for the purpose, and I suppose this perhaps arises out of the complaints made by our people and my representations to the Department. If they say now that in their judgment, the judgment of men charged with the erection of this building, $60,000 more ought to be appropriated — the building is in an unfinished state, the building is now in a proper state to be enlarged without any waste of money to the Government — I do not see why it cannot just as well come in that way as to come in the shape of a special bill, which must run the gauntlet of the committees and then of the other House. Besides, we have a bill before that committee now for a town of twenty-odd thousand people, where there is a United States court, where there is a United States revenue collector, and all the officers of the Government, and we have not yet got any response from the committee, and I am fearful we shall not get any. I would rather see this appropriation go through on the urgent-deficiency bill than to take the risk of any separate bill, although, of course, if I cannot get it through there I shall be in favor of the bill.

I only wanted to say that there has been no misappropriation so far as this building is concerned, there has been no extravagance, there has been no demand for a building beyond the wants of the community and the Government; and when the building is completed with the $60,000 added, it will not be big enough for the business of the United States Government in the city of Denver.

Mr. Edmunds. Mr. President, without any prejudice to the bill of the Senator from Florida — there must be further discussion — but without any particular reference to that bill, it is extremely desirable that there should be an executive session, and I move that the Senate proceed to the consideration of executive business.

. . . .

Mr. Call. I hope the Senator from Vermont will allow us to dispose of the Bill. . . .

Mr. Edmunds. In order to have this whole subject disposed of, I was about to suggest a unanimous understanding that we take this Bill up in the morning hour on Monday, as I wish to say something more myself on the general subject; but as the Senator from Florida is anxious about it, and this is only one little bill, if we can get a vote without further debate, I will withdraw the motion for an executive session.

The President *pro tempore.* The question is on the amendment reported by the Committee on Public Buildings and Grounds.

The amendment was agreed to.

The Bill was reported to the Senate as amended, and the amendment was concurred in.

The Bill was ordered to be engrossed for a third reading, read the third time and passed.

The Illustrations

[*Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.*]

THE BASILICA, QUEBEC, CANADA.

[Gelatine print, issued only with the Imperial Edition.]

T-SQUARE CLUB COMPETITION. DESIGN FOR COUNTRY STABLE. MR. WALTER COPE, ARCHITECT, PHILADELPHIA, PA.

THIS design received first mention in one of the regular competitions of the Club. The programme was as follows: A design for a country stable to accommodate three horses and two cows, required a plan at one-eighth scale and a perspective rendering with pen or brush.

STATION AT COMO, MONMOUTH CO., N. J. MESSRS. COPE & STEWARDSON, ARCHITECTS, PHILADELPHIA, PA.

THIS station was built last summer at a cost of about $7,000. The materials are broken range brownstone, 6′ 0″ high, red brick above, roof slated.

DESIGN FOR BARNES HALL, CORNELL UNIVERSITY, ITHACA, N. Y. MESSRS. ROSSITER & WRIGHT, ARCHITECTS, NEW YORK, N. Y.

THIS was a design made in a limited paid competition. The successful competitor was W. H. Miller of Ithaca.

FIRST PREMIATED DESIGN FOR THE PROPOSED YOUNG MEN'S CHRISTIAN ASSOCIATION BUILDING, PROVIDENCE, R. I. MESSRS. STONE, CARPENTER & WILLSON, ARCHITECTS, PROVIDENCE, R. I.

THE AMENDED DESIGN FOR THE SAME BUILDING.

THE principal changes are in the increase in the size of the main hall, in the number of class-rooms, and in the re-arrangement of the rooms in the first story.

HOUSE FOR A. N. ELLIOTT, ESQ., CHESTNUT HILL, PHILADELPHIA, PA. MR. J. C. WORTHINGTON, ARCHITECT, PHILADELPHIA, PA.

HOUSE NEAR ST. LOUIS, MO. MESSRS. EAMES & YOUNG, ARCHITECTS, ST. LOUIS, MO.

SAFE BUILDING.—XXIII.[1]

FROM GAMBETTA MONUMENT - PARIS

Lateral Flexure in beams. IN using iron and steel beams it is very important that they be supported sideways, so as not to yield to lateral flexure. Where the beams are isolated and unsupported sideways, the safe load must be diminished. Just how much to diminish this load is the question. The practice amongst iron workers is to consider the top flange as a column of the full length of the span, obliged to yield sideways, and with a load equal to the greatest strain on the flange. Modifying therefore, Formula (3) to meet this view, we should have:

[1] Continued from page 56, No. 632.

Beams not braced sideways.

$$w_1 = \frac{w}{1 + \frac{y.\ L^2}{b^2}} \qquad (78)$$

Where w_1 = the safe load, in pounds, on a beam, girder, lintel or straight arch, etc., unsupported sideways.

Where w = the safe load, in pounds, on a beam, lintel or straight arch supported sideways.

Where L = the length of clear span, in feet, that beam, etc., is unsupported sideways.

Where b = the least breadth in inches of top flange, or least thickness of beam, lintel or arch.

Where y = a constant, as found in Table XVI.

(In place of w we can use r = the moment of resistance of beam supported sideways, and in place of w_1 we use r_1 = the moment of resistance of beam *not* supported sideways.)

The above practice, however, would seem to diminish the weight unnecessarily, particularly where the beam, girder, etc., is of uniform section throughout; for while the beam in that case, would be equally strong at all points, it would be strained to the maximum compression only at the point of greatest bending-moment, the strain diminishing towards each support, where the compression would cease entirely. To consider therefore the whole as a long column carrying a weight equal to this maximum compressive strain, seems unreasonable. Box has shown however that the maximum tendency to deflect laterally is when we consider the top flange (or top half in rectangular beams, lintels and straight arches) as a column equal to two thirds of the span (unsupported sideways) loaded with a weight equal to one-third of the greatest compressive strain at any point. This greatest compressive strain is always at the point of greatest bending moment, (usually the centre of span) and is equal to the area of top flange, multiplied by $\left(\frac{c}{f}\right)$. In case of plate girders the angle-irons and part of web between angle-irons should be included in the area. Box's theory is given in Formula (5); if then we take one-third of this "maximum tendency to deflect" as safe, we should have the same Formula as (78) but with a smaller value for y. The writer would recommend using the larger value for y, where, as in plate girders, trusses, etc., the section of top flange or chord is diminished, varying according to the compressive strain at each point; and using the smaller value for y, where the section of beam, girder or top chord is uniform throughout.

Use of Table XVI.

TABLE XVI.

VALUE OF Y IN FORMULA (78).

Material of beam, girder, lintel, straight arch, etc.	Value of y for girders, beams, etc., of *variable* cross-sections.	Value of y for beams, girders, lintels, straight arches, etc., of *uniform* cross-section throughout.
Cast-Iron..........	0,5184	0,2304
Wrought-Iron..........	0,0432	0,0192
Steel..........	0,0346	0,0154
Wood..........	0,5702	0,2534
Stone..........	3,4560	1,5360
Brick..........	5,7024	2,5344

Thus the $10\frac{1}{2}''$ – 90 pounds beam at 20 feet span will safely carry (if supported sideways) a uniform load of 5,9 tons or 11,800 pounds (see Table XV.) The width of flange being $4\frac{1}{2}''$, and this width and its thickness, of course, being uniform throughout the entire length of beam, we use the smaller value for y (second column) and have for the actual safe uniform load, if the beam is not secured against lateral flexure:

$$w_1 = \frac{11800}{1 + \frac{0{,}0192.\ 20^2}{4\frac{1}{2}^2}} = \frac{11800}{1 + 0{,}379}$$

$$= \frac{11800}{1{,}379} = 8557 \text{ pounds, or } 4{,}28 \text{ tons.}$$

Had we used the larger value for $y = 0{,}0432$ we should have had

$$w_1 = \frac{11800}{1 + 0{,}854} = \frac{11800}{1{,}854} = 6365 \text{ pounds, or } 3{,}18 \text{ tons,}$$

which closely resembles the value (3,29) given in the Iron Companies hand-book, but is an excessive reduction under the circumstances.

Doubled Beams. Where two or more beams are used to carry the same load, as girders for instance, or as lintels in a wall, they should be firmly bolted together, with cast-iron separators between. In this case use for b in Formula (78) the total width, from outside to outside of all flanges, and including in b the spaces between. The separators are made to fit exactly between the inner sides of webs and top and bottom flanges. The separator is swelled out for the bolt to pass through. Sometimes there are two bolts to each separator, but it is better (weakening the beam less) to have but one at the centre of web. The size of separators and bolts vary, of course, to suit the different sizes of beams. They should be placed apart about as frequently as twenty times the width of flange of a single beam. Where beams are placed in a floor, the floor arches usually provide the side bracing. But in order to avoid un-

Tie-rods. equal deflections, and possible cracks in the arches, (from unequal or moving loads or from vibrations) and also to take up the thrust on the end beams of each floor, it is necessary to place lines of tie-rods across the entire line of beams. The size of these rods can be calculated as already explained in the Chapter on Arches (p. 215, No. 619); they are usually made, however, from $\frac{5}{8}''$ to $\frac{7}{8}''$ diameter. Each rod extends from the outside web of one beam to the outside web of the next beam. The next rod is a little to one side of it, so that the rods do not really form one straight line, but every other rod falls in the same line. Care must be taken not to get the rods too long, or there will have to be several washers under the head and nut, making a very unsightly job, to say the least. Contractors will do this however, for the sake of the convenience of ordering the rods all of one or two lengths. Where, therefore, the beams are not spaced evenly the contractor should be warned against this. One end of the rod has a "head" welded on, the other has a "screw-end," which need not be "up-set;" the nut is screwed along this end, thus forcing both nut and head to bear against the beams solidly. The distance between lines of tie-rods, would depend somewhat on our calculation, if made; the usual practice, however, is to place them apart a distance equal to about twenty times the width of flange of a single beam.

Flitch-plate Girder. Sometimes where wooden girders have heavier loads to carry than they are capable of doing and yet iron girders cannot be afforded, a sheet of plate-iron is bolted between two wooden girders. In this case care must be taken to so proportion the iron, that in taking its share of the load, it will *deflect* equally with the wooden girders, otherwise the bolts would surely shear off, or else crush and tear the wood.

We consider the two wooden girders as one girder and calculate (or read from Table XIII) their safe load, taking care not to exceed 0,03 inches of deflection per foot of span. We then, from Table VII or Formulæ (37) to (41) obtain the exact amount of their deflection under this load. We now calculate the iron plate, for deflection only, inserting the above amount of deflection, and for the load the balance to be borne by the iron-work. An example will best illustrate this:

Example.

A Flitch-plate girder of 20-foot span consists of two Georgia pine beams each $6'' \times 16''$ *with a sheet of plate-iron* $16''$ *deep bolted between them. The girder carries a load of* 13000 *pounds at its centre; of what thickness should the plate be? The girder supports a plastered ceiling.*

Strength of wooden part. From Table XIII we find that a Georgia pine beam $6'' \times 16''$ of 20-foot span will safely carry without cracking plaster 7980 pounds uniform load, or 3990 pounds at its centre (See Case (6) Table VII,) so that the two wooden beams together carry 7980 pounds of the load, leaving a balance of 5020 pounds for the iron plate to carry. The deflection of a 20-foot span Georgia pine beam $6'' \times 16''$ with 3990 pounds centre load will be, Formula (40)

$$\delta = \frac{1}{48} \cdot \frac{3990.\ 240^3}{e.\ \ i.}$$

e for Georgia pine (Table IV) is = 1200000 and

$$i = \frac{b.d^3}{12} \text{ (Table I. section No. 2), or}$$

$$i = \frac{6.16^3}{12} = 2048, \text{ therefore}$$

$$\delta = \frac{1}{48} \cdot \frac{3990.\ \ 240^3}{1200000.\ 2048} = 0{,}47''$$

Size of Iron Plate. We now have a wrought-iron plate which must carry 5020 pounds centre load, of a span of 20 feet, $16''$ deep, and must deflect under this load only $0{,}47''$.

Inserting these values in Formula (40) we have:

$$0{,}47 = \frac{1}{48} \cdot \frac{5020.240^3}{e.\ \ i.}$$

From Table IV we have for wrought-iron

$$e = 27000000$$

While for i, we have (Table I. Section No. 2)

$$i = \frac{b.\ d^3}{12} = \frac{b.\ 16^3}{12} = 341.b$$

Inserting these values and transposing we have:

$$b = \frac{5020.\ \ 240^3}{48.\ 27000000.\ 341.\ 0{,}47} = 0{,}33$$

Or the plate would have to be $\frac{1}{3}'' \times 16''$. Now to make sure that this deflection does not cause too great fibre strains in the iron, we can calculate these from Formulæ (18) and (22). The bending moment at the centre will be (22)

$$m = \frac{5020.\ 240}{4} = 301200$$

The moment of resistance will be (Table I. Section No. 2)

$$r = \frac{b.\ d^2}{6} = \frac{0{,}33.16^2}{6} = 14$$

And from (18) $\frac{m}{\left(\frac{k}{f}\right)} = r$, or transposing and inserting values,

$$\left(\frac{k}{f}\right)=\frac{301200}{14}=21514 \text{ pounds.}$$

As the safe modulus of rupture of wrought-iron is only 12000 pounds (Table IV) we must increase the thickness of our plate. Let us call the plate $\frac{5}{8}'' \times 16''$, we should then have

$$r=\frac{5.\ 16^2}{8.\ 6}=26{,}67 \text{ and}$$

$$\left(\frac{k}{f}\right)=\frac{301200}{26{,}67}=11256.$$

So that the plate would be a trifle too strong. This would mean that both plate and beams would deflect less. The exact amount might be obtained by experimenting, allowing the beams to carry a little less and the plate a little more, until their deflections were the same, but such a calculation would have no practical value. We know that the deflection will be less than 0, 47″ and further that plastering would not crack, unless the deflection exceeded $\frac{5}{8}''$ of an inch (Formula 28) as

$$20.0{,}03=0,\ 6''$$

Size of Bolts. In regard to the bolts the best position for them would, of course, be along the neutral axis, that is at half the height

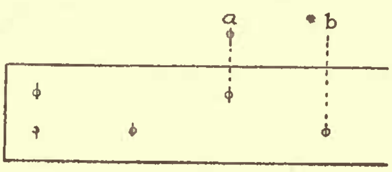


Fig. 137.

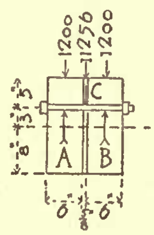


Fig. 138.

of the beam. For here there would be no strain on them. But to place them with sufficient frequency along this line would tend to weaken it too much, encouraging the destruction of the beam from longitudinal shearing along this line. For this reason the bolts are placed, alternating, above and below the line, forming two lines of bolts, as shown in Fig. (137). The end bolts are doubled as shown; the horizontal distance, $a-b$, between two bolts should be about equal to the depth of the beam. If we place the bolts in our example, say 3″ above and 3″ below the neutral axis, we can readily calculate the size required. Take a cross-section of the beam (Fig. 138) showing one of the upper bolts. Now the fibre strains along the upper edge of the girder, we know are $\left(\frac{k}{f}\right)$ or 1200 pounds per square inch, for the wood, and we just found the balance of the load coming on the iron would strain this on the extreme upper edge $=11256$ pounds per square inch. As the centre line of the bolt is only 3″ from the neutral axis or $\frac{3}{8}$ of the distance from neutral axis to the extreme upper fibres, the strains on the fibres along this line will be, of course, on the wood $\frac{3}{8}$ of 1200, or 450 pounds per square inch: and on the iron $\frac{3}{8}$ of $11256=4221$ pounds per square inch. Now, supposing the bolt to be 1″ in diameter. It then presses on each side against a surface of wood $=1'' \times 6''$ or $=$ six square inches. The fibre strain being 450 pounds per square inch, the total pressure on the bolt from the wood, each side, is:

$$6.450=2700 \text{ pounds.}$$

On the iron we have a surface of $1'' \times \frac{5}{8}''=\frac{5}{8}$ square inches. And as the fibre strain at the bolt is 4221, the total strain on the bolt from the iron is $=\frac{5}{8}.\ 4221=2638$ pounds. Or, our bolt virtually becomes a beam of wrought-iron, circular and of 1″ diameter in cross-section, supported at the points A and B, which are $6\frac{5}{8}''$ apart, and loaded on its centre C with a weight of 2638 pounds.

Therefore we have, at centre, bending-moment (Formula 22)

$$m=\frac{2638.\ 6\frac{5}{8}}{4}=4369.$$

From Table I, Section No. 7, we know that for a circular section, the moment of resistance is,

$$r=\frac{11}{14}\cdot \mathfrak{r}^3=\frac{11}{14}\cdot\left(\frac{1}{2}\right)^3=0{,}098$$

Now for solid circular bolts, and which are acted on really along their whole length it is customary to take $\left(\frac{k}{f}\right)$ the safe modulus of rupture rather higher than for beams. Where the bolts or pins have heads and nuts at their ends firmly holding together the parts acting across them they are taken at 20000 pounds for steel and at 15000 pounds for iron. We have therefore from (Formula 18) for the required moment of resistance

$$r=\frac{4369}{15000}=0{,}291.$$ Inserting this value for r in the above we have for the radius of bolt,

$$\frac{11}{14}\cdot \mathfrak{r}^3=0{,}291 \text{ and}$$

$$\mathfrak{r}=\sqrt[3]{\frac{14}{11}\cdot 0{,}291}=\sqrt[3]{0{,}3704}$$
$$=0{,}718''$$

Or the diameter of bolt should be 1,436″ or say 1 7-16″. But 1″ will be quite ample, as we must remember that the strains calculated will come only on the one bolt at the centre of span of beam; and that, as the beam remains of same cross section its whole length the extreme fibre strains decrease rapidly towards the supports, and therefore also the strains on the bolts. The end bolts are doubled however, to resist the starting there of a tendency to longitudinal shearing. We might further calculate the danger of the bolt crushing the iron plate at its bearing against it; or crushing the wood each side; or the danger of the iron bolt being sheared off by the iron plate between the wooden beams; or the danger of the iron bolt shearing off the wood in front of it, that is tearing its way out through the wood; but the strains are so small, that we can readily see that none of these dangers exist.

Keyed Girders. Another method of adding to the sum of the separate strengths of the girders is to place one under the other making a straight joint between the two parts and to drive in hard wood keys, as shown in Fig. 140.

The keys can either be made a trifle thicker than the holes and the beams then firmly bolted together so as to take hold of keys securely; or, keys can be shaped in two wedged-shaped pieces to each key, and driven into the hole from opposite sides, after the beams are firmly bolted. In the latter case, care must be taken that the joint between the opposite wedges is slanting or diagonal, and *not horizontal* or else, of course, the keys would be useless. Either method allows, for tightening up, after shrinkage has taken place. Iron bands are frequently used in place of bolts but they are more clumsy, less liable to *all* fit exactly, and besides do not allow for tightening up so easily as with bolts. Where beams are very wide, however, the bands are very advantageous. Tredgold says the keys should be twice as wide, as high; and that the sum of all their heights should equal one and a third times the depth of girder. They can be easily calculated, however. As the main strain on them is a horizontal shearing strain, and the stress or resistance to shearing is greatest *across* the grain the keys should of course, be placed with their grain running as nearly as possible vertically. Of course, as the greatest horizontal shearing exists near the supports, the end wedges should be the strongest; it is customary, however, to make them all of the same size for convenience of execution. The amount of the horizontal shearing is found by Formula (13).

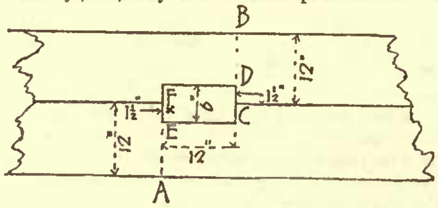


Fig. 139.

Horizontal shearing on Keys.

Besides the horizontal shearing strain there will also be a crushing strain on the sides of wedges, which will be greatest, where the greatest fibre strains exist. This of course, is at the point of the greatest bending moment on the beam. Let us consider the wedge at A–B Fig. (140) which has been drawn enlarged in Fig. (139.)

Compression on Keys.

The lower half of the girder, being in tension, in trying to stretch its fibres meets with the resistance of the wedge along E F, therefore

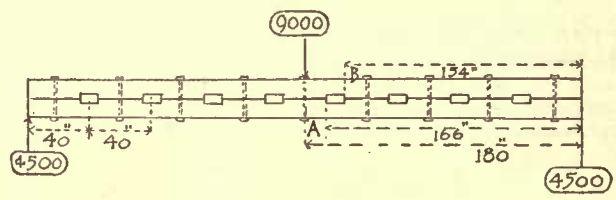


Fig. 140.

tends to crush or compress this surface. The amount of this compression, per square inch, will be equal to the average fibre strain between E and F. Now the fibre strain at A can be readily found, by finding the "bending moment" at A and dividing this by the moment of resistance of the girder (see Table I) and Formula (18). This gives the fibre strains at A. The average fibre strain on E F will be to the strain at A as the distance of x from the neutral axis, is to the depth of half the beam; x being the centre of E F, or:

Extreme fibre strain a: average fibre strain on wedge $=$ E A: E x. The amount of the compression on E F will of course equal the area of wedge at E F (that is E F multiplied by the breadth of girder), and this area multiplied by the average fibre strain on E F. The greatest compression on E F will of course be at F, and equal to twice the average fibre strain, as E F $=$ 2. E x.

In the same way, we find that the upper half of the girder, being in compression, is forcing its fibres towards the centre causing compression on the surface D C. The amount of this compression is found similarly as for that on E F, the only difference being in the difference in bending moments at B and A. The key therefore becomes virtually a cantilever, the built-in part being between E F and C, and the load applied on the free end C D, the load being a uniform one and equal to the amount of the compression on C D.

Weakest Point of Girder. The weakest point of the girder itself will be either at the point of greatest bending moment, or at key nearest to it, where, of course the girder will not be of full section, being weakened in the part cut away for key. An example will more fully illustrate all of the foregoing.

Example.

A spruce girder (*Fig.* 140) *of 30-foot clear span is built up of two girders* 10″ × 12″ *each, making the whole section* 10″ × 24″. *Georgia pine keys are used, each* 6″ × 12″ (*and, of course*) 10″ *across girder; they are placed with grain vertically* 3′ 4″ *between centres and same distance from centre of last key to support. The girder helps support a plastered ceiling. What is the safe centre load on girder?*

Calculation of Keyed girder. The girder is (d =) 24″ deep and (L =) thirty feet long; now $1\frac{1}{6}$. L would be 35, therefore d is less than $1\frac{1}{6}$ L, and from rule contained in Table VIII for spruce we must calculate for deflection, not rupture, in order to be safe. Formula (40) gives the rule for deflection of a centre load on a girder or beam. It is:

$$\delta = \frac{1}{48} \cdot \frac{w.\,l^3}{e.\,i} \text{ or transposing,}$$

$$w = \frac{\delta.48.e.i}{l^3} \text{ where } w \text{ would be the safe centre load, in}$$

pounds. Now in order not to crack plastering, we have from Formula (28)

$$\delta = L.\ 0{,}03 \text{ or}$$
$$\delta = 30.\ 0{,}03$$
$$= 0{,}9.$$

From Table IV we have for spruce:

$$e = 850000$$

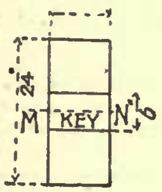


Fig. 141.

From Table I, Section No. 17, we have for the weakest section of the girder, which would be through a key, and as shown in Fig. 141,

$$i = \frac{b}{12} \cdot (d^3 - d_1^3)$$

$$= \frac{10}{12} \cdot (24^3 - 6^3) = 11340, \text{ therefore}$$

inserting these values in the transposed Formula (40)

$$w = \frac{0{,}9.\,48.\,850000.\,11340}{360^3}$$
$$= 8925$$

Or the safe centre load, not to crack plastering, would be, say 9000 pounds.

End Keys. Now let us try the keys. We first take the greatest horizontal shearing, which will be at the end keys.

The vertical shearing at these keys will be equal to the reaction (see Table VII, or Formula 11.)

As the load is central, each reaction will, of course, be one-half the load, or 4500 pounds, therefore the vertical shearing strain at end key, will be (a little less than)

$$x = 4500$$

Now from Formula (13) we know that the horizontal shearing strain at the same point is:

$$\frac{3}{2} \cdot \frac{x}{a}$$

For the area we take the full area of cross-section or $a = 10.24 = 240$, therefore horizontal shearing strain:

$$\frac{3.\,4500}{2.\,240} = 28{,}125 \text{ pounds per square inch.}$$

The amount of this strain that will act on each key is, of course, equal to the area at the neutral axis from centre to centre of key, or 40. 10 = 400 square inches multiplied by the strain per square inch, or

$$400.\ \ 28{,}125 = 11250 \text{ pounds.}$$

To resist this we have a key 12″ × 10″ = 120 square inches, being sheared across the grain. From Table IV we know that the safe shearing stress of Georgia pine across the grain or fibres, is:

$$\left(\frac{g}{f}\right) = 570 \text{ pounds so that the key could safely stand an}$$

amount of horizontal shearing

$$= 570.\ \ 120 = 68400 \text{ pounds}$$

or more than six times the actual strain. Had we, however, placed the grain of the key horizontal, the shearing would be with the grain or along the fibres; the safe shearing stress this way for Georgia pine (Table IV) is only 50 pounds per square inch, so that the key would only have resisted

$$= 50.120 = 6000 \text{ pounds, or it would have been in}$$

serious danger of splitting in two.

Central Keys. Now take the Key A B immediately to the right of the weight. The bending-moment at A will be (Table VII)

$$m_A = 4500.166 = 747000$$

and at B

$$m_B = 4500.154 = 693000$$

Now at A and B, the girder being uncut, the moment of resistance will be (Table I, Section No. 2)

$$r = \frac{10.\,24^2}{6} = 960$$

Dividing the bending moment by the moment of resistance (Formula 18 transposed) gives the extreme fibre strains,

$$\text{at A} = \frac{747000}{960} = 778 \text{ pounds.}$$

$$\text{and at B} = \frac{693000}{960} = 722 \text{ pounds.}$$

Now the centres (X and Y, see Fig. 139) of each side of key will be $1\frac{1}{2}$″ from neutral axis, the extreme fibres being, of course, 12″ distant from neutral axis, therefore average strain on side of key at A. (Or

$$X, \text{Fig. } 139) = \frac{1\frac{1}{2}}{12} \cdot 778 = 97 \text{ pounds,}$$

$$\text{and at B (or } Y, \text{ Fig. } 139) = \frac{1\frac{1}{2}}{12} \cdot 722 = 90 \text{ pounds.}$$

The extreme compression, will, of course, be on the lower edge of key, at A and will be = 2.97 = 194 pounds per square inch. From Table IV we find that Georgia pine will safely stand a pressure of 200 pounds per square inch, *across* the fibres, so that we are just a little inside of the safety mark. We now have to consider our key as a cantilever with cross-section 10″ wide and 12″ deep, projecting 3″ beyond the support and loaded uniformly with a weight equal to 90 pounds per square inch, or

$$u = 90.3.10 = 2700 \text{ pounds.}$$

Now the bending moment at support is, (Formula 25.)

$$m = \frac{2700{,}3}{2} = 4050 \text{ pounds.}$$

The moment of resistance (Table I, Section 2) is

$$r = \frac{10.12^2}{6} = 240$$

Therefore (Formula 18) the extreme fibre strains on key

$$= \frac{m}{r} = \frac{4050}{240} = 17 \text{ pounds.}$$

Or not enough to be even considered seriously.

Notched girders. Another method of combining and strengthening wooden girders, is to cut them with saw-shaped notches, as shown in (Fig. 142) and fit the teeth closely together, firmly bolting the two parts together, so as to force them to act

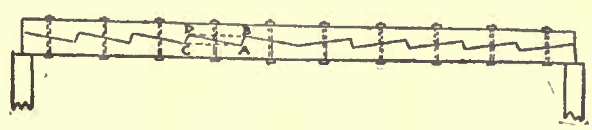


Fig. 142.

together as one girder. Sometimes the top surface slants towards each end, and iron bands are driven on towards the centre, till they are tight. But bolts are more reliable, and not likely to slip; where the girder is broad, they should be doubled, that is, placed in pairs across the width of girder. The distance between bolts should not exceed twice the depth of girder. Great care must be taken to get the right side up. Many text-books even being careless in this matter. It must be remembered that the upper fibres are in compression, crowding towards the centre, while the lower ones, in tension, are pressing away.

The girder must therefore be placed, as shown, so that the two sets of fibres will meet at the short joints and oppose each other. The girder is easily calculated similarly to the former example. The crushing on C D or A B can be found, and also the stress on their extreme edges; this must not exceed the safe stress of the material for compression across the fibres. Then D B or C A must have area sufficient to resist the horizontal strain.

Size of Bearings. In all these girders the most careful fitting of joints is necessary; then, too, the ends must have sufficient bearing not to crush under the load. Thus, take the former example, the reaction was 4500 pounds; the safe resistance of spruce to crushing across the fibres is (Table IV) = 75 pounds.

We need therefore an area = $\frac{4500}{75}$ = 60 square inches, and as the girder is 10″ broad it should bear on each support $\frac{60}{10} = 6$ inches. The end of girder should be deep enough to resist vertical shearing. In our case it is trifling, and we need not consider it. In all of these examples we have omitted the weight of the girder, to avoid complication. This should really be taken into account, in such a long girder, and treated as an additional but uniform load.

Continuous Girders. When girders run over three or more supports in one piece, that is, are not cut apart or jointed over the supports, the existing strains and reactions of ordinary girders, are very much altered. These are known as "continuous girders." If we have (Fig. 143) three supports, and run a continuous girder over them in one piece and load the girder on each side it will act as shown in Fig. 143; if the girder is cut it will act as shown in Fig. 144. Very little thought will show that the fibres at A not being able to separate in the first case, though they want to, must cause considerable tension in the upper fibres at A. This tension, of course, takes up or counterbalances part of the compression existing

there, and the result is that the first or continuous girder (Fig. 143) is considerably stronger, that is, it is less strained and considerably stiffer, than the sectional or jointed girder (Fig. 144). Again we

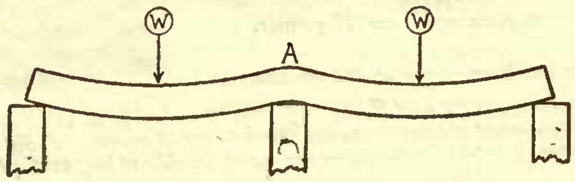


Fig. 143.

can readily see that the great tension and conflict of the opposite stresses at A would tend to cause more pressure on the central post in Fig. 143, than on the central post in Fig. 144, and this, in fact, is the case. Below are given the various formulæ for reactions, greatest bending moments and deflections, for the most usual cases of continuous girders. The architect can, if he wishes, neglect to allow for the additional strength and stiffness of continuous girders, as both are on the safe side. But he must never overlook the fact

Variation of Reactions. *that the central reactions are much greater*, or in other words, that the end supports carry *less*, and the central supports carry *more*, than when the girders are cut.

Bending moments can be figured, at any desired point along a

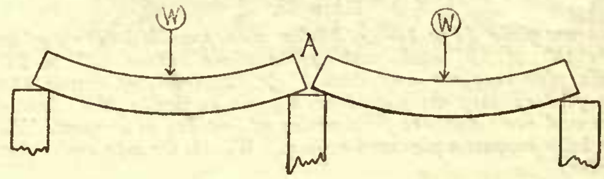


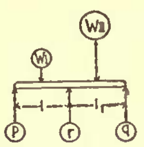
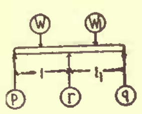
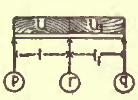
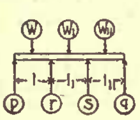
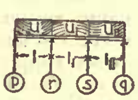
Fig. 144.

continuous girder, as usual, subtracting from the sum of the reactions on one side multiplied by their respective distances from the point, the sum of all the weights on the same side, multiplied by their respective distances from the point. Sometimes the result will be negative, which means a reversal of the usual stresses and strains. Otherwise the rules and formulæ hold good, the same as for other girders or beams. The following Table gives all necessary information at a glance.

Louis De Coppet Berg.

TABLE XVII.

CONTINUOUS GIRDERS.

Illustration.	Description.	Amount of Reactions.	Amount of Greatest Bending Moments.	Amount of Greatest Deflections.
	Two equal spans each carrying a central load but loads not equal. $w_I \lesseqgtr w_{II}$ $l = l_I$	*Left reaction.* $p = \frac{13 . w_I - 3 . w_{II}}{32}$ *Centre reaction.* $r = \frac{11}{16} . (w_I + w_{II})$ *Right reaction.* $q = \frac{13 . w_{II} - 3 . w_I}{32}$	*Located at r* $m = \frac{3}{32} . l . (w_I + w_{II})$	*Deflection in left span l* $\delta_I = \frac{23 . w_I - 9 . w_{II}}{1536 . e . i} . l^3$ *Deflection in right span l_I.* $\delta_{II} = \frac{23 . w_{II} - 9 . w_I}{1536 . e . i} . l^3$
	Two equal spans each carrying a central load $= w$, loads equal. $w = w_I$ $l = l_I$	*End reactions.* $p = q = \frac{5}{16} . w$ *or* $= \frac{5}{32} . (w + w_I)$ *Centre reaction.* $r = \frac{11}{8} . w$ *or* $= \frac{11}{16} . (w + w_I)$	*Located at r* $m = \frac{3}{16} . l . w$ *or* $= \frac{3}{32} . l . (w + w_I)$	*Deflection in either span* $\delta = \frac{w . l^3}{110 . e . i}$ *or* $= \frac{l^3}{220 . e . i} . (w + w_I)$
	Two equal spans each loaded with a uniform load $= u$ $u = u_I$ $l = l_I$	*End reactions.* $p = q = \frac{3}{8} . u$ *or* $= \frac{3}{16} . (u + u_I)$ *Centre reaction.* $r = \frac{5}{4} . u$ *or* $= \frac{5}{8} . (u + u_I)$	*Located at r* $m = \frac{u . l}{8}$ *or* $= \frac{l}{16} . (u + u_I)$	*Deflection in either span* $\delta = \frac{u . l^3}{185 . e . i}$ *or* $= \frac{l^3}{370 . e . i} . (u + u_I)$
	Three equal spans each carrying a central load $= w$, all loads equal $w = w_I = w_{II}$ $l = l_I = l_{II}$	*End reactions.* $p = q = \frac{7}{20} . w$ *or* $= \frac{7}{60} . (w + w_I + w_{II})$ *Central reactions.* $r = s = \frac{23}{20} . w$ *or* $= \frac{23}{60} . (w + w_I + w_{II})$	*Located at r or s* $m = \frac{3 . w . l}{20}$ *or* $= \frac{l}{20} . (w + w_I + w_{II})$	*Deflection in central span* $\delta = \frac{w . l^3}{480 . e . i}$ *or* $= \frac{l^3}{1440 . e . i} . (w + w_I + w_{II})$ *Deflection in either end span* $\delta = \frac{w . l^3}{87 . e . i}$ *or* $= \frac{l^3}{261 . e . i} . (w + w_I + w_{II})$
	Three equal spans each loaded with a uniform load $= u$ $u = u_I = u_{II}$ $l = l_I = l_{II}$	*End reactions.* $p = q = \frac{2}{5} . u$ *or* $= \frac{2}{15} . (u + u_I + u_{II})$ *Central reactions.* $r = s = \frac{11}{10} . u$ *or* $= \frac{11}{30} . (u + u_I + u_{II})$	*Located at r or s* $m = \frac{u . l}{10}$ *or* $= \frac{l}{30} . (u + u_I + u_{II})$	*Deflection in central span* $\delta = \frac{u . l^3}{1920 . e . i}$ *or* $= \frac{l^3}{5760 . e . i} . (u + u_I + u_{II})$ *Deflection in either end span* $\delta = \frac{u . l^3}{145 . e . i}$ *or* $= \frac{l^3}{435 . e . i} . (u + u_I + u_{II})$

Where w, w_I, w_{II} = the central concentrated loads in pounds, on either span, being equal, when so stated.
" l, l_I, l_{II} = the length of respective spans, in inches, all being equal.
" u, u_I, u_{II} = uniform loads on each span, in pounds, all being equal.
" p, r, s, q, = the amount of respective reactions, in pounds.
" m = the bending moment, in pounds-inch.

Where $\delta, \delta_I, \delta_{II}$ = the amount of deflection in inches, if girder of uniform cross-section throughout.
" e = the modulus of elasticity of the material, in pounds-inch, (see Table IV).
" i = the moment of inertia of the cross-section, in inches, (see Table I).

[To be continued.]

The American Architect and Building News.

Vol. XXIII. Copyright, 1888, by Ticknor & Company, Boston, Mass. No. 637.

March 10, 1888.

Entered at the Post-Office at Boston as second-class matter.

CONTENTS

FOR the first time in many years, there seems to be a little encouragement for those who have at heart the artistic future of the American Republic. According to the New York *Times*, it seems likely that Congress will agree at this session, whatever else it may do with the customs tariff, to abolish the impost upon works of art, thereby reopening to American students the advantage of studying what other people have done before them without paying an exorbitant price for the privilege, as well as provoking those from whom they can learn most into closing their doors against them. The second favorable indication is to be found in the passage by the Senate of Senator Hoar's bill for the establishment of a National Art Commission. We described this excellent measure at some length when the draft was first presented, and need only recall that it provides for the establishment of a Commission, consisting of four sculptors, four painters and three architects, all eminent in their various callings, and three other persons noted for their knowledge of fine art, which shall meet in Washington at least once in every year, and report upon the character and value of such plans of public buildings, monuments or works of art as shall be referred to it by either House of Congress or by the Joint Committee on the Library, and shall, when authorized by Congress, make selections from designs offered by competitors for works of art ordered by Congress. Whether the bill will pass the other House, or be approved by the President if it should, can hardly be predicted at present, but it is a good deal to have it so readily carried through the Senate, and even if it should fail to become a law this year, it is more than likely that the increasing knowledge of such matters among educated men, which has already enlisted, permanently, we may hope, a majority of the Senate on the side of enlightened common-sense, will soon extend its influence over the popular branch, to the great advantage of the citizens of this country.

WHENEVER the change shall come, we may look for a new era in our artistic progress. Up to this time we have never had anything approaching, we will not say to knowledge, but to decent discrimination in artistic matters on the part of the Government, while such recognition of artistic merit as has been officially bestowed has, as a rule, been of such a character as to make its recipient ridiculous. It is quite time that this way of managing an important public interest should be modified, and there is no better method of introducing a better system than by the appointment of such a Commission as Senator Hoar's bill contemplates. That a Commission of experts is the proper body to judge of artistic matters no one can doubt, and there are abundant proofs of the success of such bodies in carrying out their duties, and of the miserable failure of attempts by uninstructed persons to usurp their functions. With a Commission of men whose names and reputation, inspired respect at the head of American artistic affairs, there would soon be an effort among artists to obtain their favorable notice, and the honor which their awards would bestow would supply just the stimulus which art has always lacked among us. As we have frequently insisted, there is an immense amount of artistic feeling in this country, which remains undeveloped for want of something to call it forth. Every one remembers the surprising quantity of the most beautiful and original work which was brought out by the offer of liberal prizes by a firm of wall-paper manufacturers, and in some of our best architectural competitions the designs shown are worthy of any age or country, but the effect of these is irregular and transitory; they elicit good work from those already prepared to do such work, but do almost nothing to encourage persons of more modest attainments as compared with the steady incentive offered by the prospect of Government approval and employment. Some one has said that the knowledge that bishoprics were open to merit was the principal means of keeping the whole body of English clergymen to those habits of industry and enlightened charity which do them so much honor, and the knowledge that an American painter, sculptor or architect could hope, by satisfying a jury of men skilful in his profession, to be sometime publicly honored and rewarded, would redouble the energy and application of the younger men, and, among the older ones, put an end pretty quickly to the practice of those devices by which charlatans are enabled to parade as prodigies before people who have no means of testing their pretensions.

AS to the general question, which will occur to some people, whether art itself is a thing to be encouraged among intelligent persons, or is merely a useless and enervating luxury, Mr. William Morris and Mr. Ruskin can speak much more eloquently than we; but it is worth while for those who denounce art and artists as unworthy the notice of the "practical" and "go-ahead" inhabitants of the United States to reflect whether there may not, after all, be some virtue in quiet contentment, and in the enjoyment of beauty which a little artistic training opens to men. Bustling, not to say greedy, as we are, it is impossible for every one to be first in the race for money. Some must stumble, or fall sick by the way, or, perhaps, be content to lose their place for the sake of helping one still feebler than themselves. The number of such unsuccessful ones, as competition increases, grows larger every year, and the country every year feels more seriously the need of consolation which true art can bring to those who can understand it. To one who knows the depth of feeling, the quick sympathy, inherent in the American character, there is something inexpressibly sad in the dreariness of American middle-class habitations. Where an Englishman would have his sweet little cottage, with some pretty carving, or beautiful lace curtains, or wonderful piece of gardening, to distinguish it from the rival dwellings around it, or where an Italian workman's nerves would absorb balm from the pretty frescos on his front wall, and the brilliant colors of the family clothes-line, the American, more sensitive and more intellectual than either, is condemned to spend his life in a dreary, heartless box of inch-boards, dropped at the side of a dusty street, about which there is nothing to interest or please any person in the smallest degree. In such abodes Americans become the quiet, enduring drudges that we know them. They have nothing to live for but to get a little richer, and if that fails there is nothing left. They could love their homes with a passion worthy of a Greek, but there is nothing about their homes which anybody could by any possibility love, and the only ray of enjoyment, which is with most Americans associated with a habitation, comes to them on the day they get out of one, and move into another. From this arid existence the love of art offers, to most people, the only relief, and none could be more effectual. A man whose family is well and happy, and whose dwelling smiles upon him with a beauty of its own, neither needs nor cares to be rich. If he can earn money enough to feed and clothe himself and his wife and children comfortably, and lay up something for a time of need, he has everything in the way of happiness that the world can bestow. Most people dimly appreciate this, but, never having seen a modest house in which any one could take the smallest pleasure, they imagine that one must be rich enough to buy Bouguereau's pictures, and Italian statuettes, before he can take comfort in life; quite forgetting that a spray of roses, or a pretty child, are worth all the pictures and statues ever made; that it is useless for any one to try to take pleasure in Bouguereau, who

does not know enough of art to prefer Nature to it, and that more real pleasure and contentment can be got, by the man that owns it, out of a beautiful door-knocker, or a well colored room, than most millionnaires now get from the contemplation of the treasures of the Louvre. Of course it is necessary, in order to appreciate art of any kind, however humble, to know something about it, and such appreciation will not become general until the knowledge is more diffused than it is now; but the elevation of a knowledge of art into something worth the notice of a member of Congress will be a great step in advance, and the emulation of the artists who, from every village, will try to obtain Government recompense, will soon do the rest.

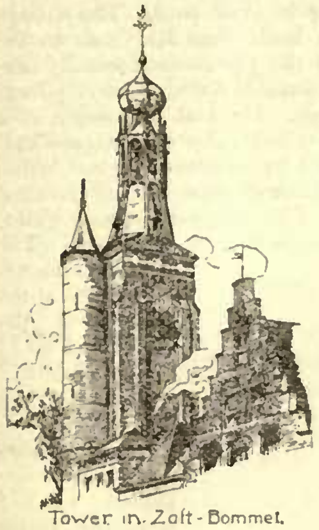
THE subject of doing masonry in frosty weather continues to take a good deal of the attention of experts in building. A correspondent of the *Building News* makes a contribution to the discussion by mentioning that the mechanical structure of the mortar is an important factor in determining its resistance to frost, and that "a mortar to resist frost must have a very fine matrix, or, in other words, very minute pores." He says that this quality is given by the use of "smith's ashes finely ground, which have also the advantage of being vesicular." It is not quite clear whether this writer means that the ground smith's ashes should be used in place of sand or not. The term matrix is generally used to indicate the cementing substance by which the coarser particles of mortar or concrete are bound together, that is, in most cases, the lime or cement; and the sand or other comparatively coarse material is known as the "aggregate." If mortar is to have "very minute pores," it would seem necessary to look out for the fineness of the aggregate rather than of the lime or cement, which are naturally fine enough, and it seems probable, therefore, that the ashes are to be used in place of sand. In either case this is a valuable suggestion. Fine sand is, under ordinary circumstances, rather objectionable, but finely-ground brick dust is said, under some circumstances, to be much better than any sand for mixing with lime for mortar, and this would give the fine grain which is considered desirable. Another correspondent of the same journal, speaking of the addition of salt to mortar to prevent it from being injured by frost, objects to it as likely to attract dampness. It is a common notion that lime mortar for plastering, mixed with sand from the seashore, will be damp in certain states of the weather for many years afterward, and architects of the last century in London, if they required Thames sand to be used for mortar, always specified that it should be taken from above London Bridge. This correspondent refers to the use of beer in mortar, and inquires whether the alcohol contained in it is of any service. If so, he thinks that crude alcohol could be obtained for the purpose much more cheaply than beer. We have an idea that the employment of beer in mortar has been pretty conclusively proved to be of doubtful advantage, and it seems hardly likely that so volatile a matter as alcohol could be of any use, but the letter offers a suggestion for future experimenters which may be useful.

THE discussion provoked by the recent theatre fires have developed some useful ideas. At two recent meetings of the Royal Institute of British Architects, papers have been read on theatre construction and comparisons made of the various London theatres from which much is to be learned. It is one of the commonplaces of the ordinary rules for building theatres that a considerable amount of woodwork is necessary in the interior of the auditorium in order to give resonance enough for proper acoustic quality. As is well known, some of the best theatres in the world, from the point of acoustics, are entirely lined with boards and have the floor of the auditorium of wooden construction, purposely arranged with a large air-space beneath it, to form a sort of sounding-board. Of course, such a structure is very combustible, and therefore unsuited to modern ideas, but most architects dread the sharp, disagreeable effect of sound on bare stone or brick walls, and think that some sort of sounding-board effect must necessarily be provided in the auditorium of every theatre. One of the participants in the discussion of the papers expressed the opinion that brick walls could be so lined with wood as to secure resonance without exposing the combustible material to the rapid destruction so much to be feared in theatres, and in this he was undoubtedly right. Another preferred not to use wood at all, but to provide for resonance by linings of incombustible material, held at a little distance from the wall. This, again, might unquestionably be done with plaster on wire lath or with sheets of the wire cloth and asbestos fabrics now made, and such a resource would probably be invaluable for curing harsh echoes in fireproof buildings. There are, however, other less obvious ways of obtaining an excellent effect, if we may judge from the statements made in the course of the discussion. In the Alhambra Theatre, which is the only perfectly incombustible theatre in London with the exception of the very small Terry's Theatre, no wood whatever is used, or any other combustible material, yet very satisfactory resonance was obtained by building the walls of concrete, in which were so many air-spaces as to give the same sort of sympathetic vibration obtained with a wood lining. Every one remembers the antique practice of putting brass or earthenware amphoræ under the seats of the huge stone theatres of Greece and Rome to reinforce the sound, and it seems quite possible that the crevices in concrete, particularly if made, as we believe that at the Alhambra Theatre is, with cinders and similar spongy, porous masses, might have nearly the same effect. In buildings where concrete could not well be used, it is not impossible that linings of porous terra-cotta might be acoustically serviceable, and hollow bricks, of the various shapes now in use, might be very freely introduced in any wall. With walls made dry and resonant by a cellular structure of this sort, and with such ample and convenient exits as the Italian Government now requires, and, perhaps, with Asphaleia stage-fittings, theatres might be made absolutely safe, and the sacrifice of life to amusement, which has been going on since the time of Cæsar, might be stopped.

THE dangers which surround the dwellers in cities, dangers which are harder to detect and more difficult to guard against than those that surround the sailor in the stormiest of oceans, were once more exemplified by an explosion that occurred in Buffalo last week of gas, styled with reporters' customary perspicacity "sewer gas," that had collected in the underground conduits and man-holes of the local telephone company. The workmen whose torch ignited the gas were more or less seriously burned, while the man-hole covers for a distance of several blocks from the centre of the explosion were blown as high as the cornices of adjacent buildings, but, fortunately, crushed no one in their fall. New York towns seem to be in a most eruptive condition of late: Rochester and Binghamton have had explosions in the public sewers and in the cellars of buildings due to the ignition of naphtha gas caused by leakage from the pipes of one of the great oil companies whose pipe-lines pass through the cities, and we are much more inclined to attribute the Buffalo accident to a similar cause than to the reporters' scape-goat. It is satisfactory to know that in the case of one of the earlier accidents the grand-jury found a criminal indictment against the oil company, and in the other case that the city has brought a suit for sixty thousand dollars for damages done to the public sewers. The telegraph and telephone companies may be expected to seize on the Buffalo incident as one more excuse for delay in the process of getting all the wires underground.

THE prospect for the compulsory examination and registration of architects in Great Britain does not at present seem very bright. A bill providing for such examination and registration has been introduced into Parliament, which is intended to apply alike to architects, engineers and surveyors. Not unnaturally, many people think that the draft of the bill must at least have been sanctioned by the Royal Institute of British Architects, and a large number of letters on the subject have been addressed to the Council of the Institute. Instead of replying to them separately, the Council has answered all such inquiries at once by a letter to the *Times*, in which it says that "instead of being drafted, as might reasonably be assumed, by the chartered corporations which represent the three professions affected by it, namely, the Royal Institute of British Architects, the Institution of Civil Engineers, and the Surveyors' Institution, the bill has been drawn up by a committee entitled 'the Architects', Engineers' and Surveyors' Registration Act Committee,' composed of one civil engineer, two lawyers, three doctors and ten architects and surveyors." The letter makes no detailed criticism of the proposed bill, but the statement that only one civil engineer was concerned in the concoction of a statute to be imposed on the whole profession is likely to be quite sufficient to prevent its serious consideration in Parliament.

ITALIAN CITIES — TURIN. — I.



THEOPILE GAUTHIER once said that Italy is the charnel-house of dead cities, and in spite of the reawakening activity which manifests itself throughout the whole peninsula this comparison is not out of place to-day, for no other country can boast the possession of so large a number of cities which once were powerful and opulent, and which the turn of events has reduced to a second or the lowest rank. From a chronological and artistic standpoint, Italian cities must be classed in several catagories by reason of their antiquity, in order that studious travellers may ferret out more rapidly and exactly their historic character and their different values in the domain of art. This classification is not difficult if one merely takes into account the general characteristics which exist in each city. We can, for instance, include in the first category those cities whose principal monuments are related to the Classic epoch, such as Rome, Pompeii, the ancient cities of Sicily, those of Latium, where we find structures of Cyclopean origin, and those of Umbria and Tuscany, which still preserve relics of the Etruscan age. Then come those which have been embellished and enriched with monuments during the ages which followed the fall of Rome and preceded the birth of the Renaissance, and in which we recognize the double imprint of the Gothic manner and the Byzantine style, as well as the jumble of different styles, which, toward the end of that period, began to be mixed with one another. Such are Milan, Ravenna and Venice — mentioning only the most important. The third category must include the cities where are preserved the monuments in which we begin to discern the effort of native artists to enfranchise the Italian school from the yoke of foreign artists, and create a pure and independent style more appropriate to the tastes, the climate, the weather and the the needs of Italy, than those imported by the Greek Byzantine architects, or by the Goths. It is in these monuments that first appears the glimmering of the dawn of the Italian Renaissance: we find them particularly at Pisa, at Florence, in all Umbria and in Emilia. Another category ought to be specially consecrated to the cities which, by their political structure belong to the age of the Renaissance, and almost all the large cities of the peninsula have the right to range themselves in this category, for there is none amongst them which has a past and a history on which we can say that the Renaissance has not left its seal of grace. Finally, the last category may be reserved for the cities of more recent foundation, which, with the exceptions of some isolated specimens of Roman wall or ancient ruin of doubtful authenticity, have never had throughout the vanished ages any truly artistic structure, and only recently have dreamed of giving themselves airs of elegance and assuming to have a monumental aspect. Here the buildings are almost all modern, and allow us to judge of the tendencies to which Italian art has yielded in recent times. Turin offers us the most perfect image of those Italian cities which lack the Classical physiognomy which reigns over almost all the rest of Italy. Naturally, this classification could be only approximately exact, particularly because of the frequency with which we encounter in the same centre, confounded or at least approximated, the traces of the different epochs in a country which has experienced all the glories and all the rebuffs of fortune. But in spite of inevitable uncertainties which are the result of such a mixture, some such classification is necessary for the observer, who, while making a pleasure-trip down the peninsula, desires to acquire certain clear and exact impressions, and thoroughly reliable information upon the different architectural methods which have prevailed in this country during succeeding periods.

Turin is the first great city seen by the traveller who arrives in Italy by the Mt. Cenis tunnel. The population is very active and industrious, and consequently makes rapid progress. Without having achieved the marvelous development which some of the cities of the New World present, it has a very satisfactory growth. In 1377 it contained only 4,200 inhabitants. It now holds 250,000; it is thus one of the most flourishing cities. On its arms it bears the symbol of a bull. The savants have suggested the most contradictory interpretations apropos of this device, while the popular imagination has discovered a most curious even if not the most credible explanation of it. The banks of the Po were formerly infested by a many-headed hydra, which pitilessly devoured every traveller who approached. Those who met the monster face to face died instantly. The Allobroges sent against it an enormous bull, which killed it with its horns, and the citizens in token of gratitude adopted the figure of the liberating beast, and introduced it in the municipal escutcheon. Note here the remote analogy between this legend and that of the head of Medusa.

The Metropolitan Church of Turin is dedicated to St. John, and in the first place was built at the beginning of the seventh century by Agilulphe, a Lombard duke; but it was sacked and destroyed in the course of the wars which desolated Italy during the invasions of the barbarians, so that in 1498 it had to be reconstructed for the second time, after the designs of Pontelli, architect to Pope Sixtus IV. The façade which we see to-day dates back, then, to the end of the fifteenth century. It is almost entirely of Carara marble, and bears no trace of the Gothic style which ruled throughout the sub-Alpine region in preceding centuries. Three portals pierce the façade — full-centered doorways in the Greco-Roman style, which the Italian artists practised in revolt against the architectural methods of the North. Upon each side of the doorways rise two pilasters, which serve to support an attic pierced by two windows. This attic is surmounted by a Greek pediment, and is connected with the two extremities of the plan by two reflex

The Synagogue, Turin.

curves. The interior of the church is divided into three naves, enriched with stucco, gilding and decorations in the style of the Decadence. One of the chapels is enriched with paintings by Albert Dürer, of Nuremburg, and this *chef-d'œuvre* is all the more precious that the relics left by the brush of the grand Nuremburg master are very rare. On another altar is preserved the St. Sicaire, given by Marguerite de Charny to the dukes of Savoy. This relic was first found at Chambery, but the duke Emmanuel Philiberto, having learned that St. Charles Borromeo, in pilgrim garb, was journeying into Savoy to pay it reverence, caused it to be brought to Turin in order that the holy pilgrim might the sooner finish his pilgrimage. The most remarkable things that

this church incloses in the way of decoration are four funerary monuments erected by the order of Charles Albert in honor of Amadeus VIII, Emmanuel Philiberto, Prince Thomas and Charles Emmanuel II, his ancestors. The tomb of Emmanuel Philiberto was executed by the sculptor Pompeo Marchesi. On the front of the die is the ducal coat-of-arms. The statue of the hero is instinct with the pride of manhood: he stands erect, with sword inclined, his glance animated with an expression of hauteur. At the right is the statue of History engraving on the die the words that Munificence standing before her, and supported by an heraldic lion, dictates to her. The mausoleum of Amadeus VIII, the work of Cacciatori, is conceived in a different spirit. The duke afoot, in attitude calm and severe, is supported on one side by Justice and on the other by Felicity. The monument of Charles Emmanuel II, sculptured by Fraccaroli, is distinguished from the others by the eccentricity of its ordonnace and the richness of its ornamentation. It is in character distinctly allegorical, and is composed of three niches, the left-hand one of which contains the statue of Peace represented in the guise of a warrior, who, half-relieved of his armor, is fondly caressing with his disengaged hand the pommel of his sword. The middle niche contains Architecture, symbolized by a woman who holds a tablet on which is engraved a sketch-plan of the cathedral. The one at the right contains the figure of Munificence, here presented under the aspect of a matron attractive of form and sumptuous in attire.

The Cathedral [S. Giovanni Battista]. Turin.

The Church La gran Madre di Dio is one of the most worthy of admiration amongst those which Turin contains. It has all the characteristics of a sanctuary erected in the Grecian style, except the low dome, which rather recalls the tendencies of Greco-Roman architecture. The façade is composed of a vast portico, formed by a range of fluted columns which support a pediment, in the centre of which is represented in bas-relief some religious subject. A flight of steps closed by iron gates leads to the portico, and is enclosed between two rectangular piers surmounted by statues. That which tends to render the effect of this building still more impressive is, that it is erected on the right bank of the Po, facing the bridge which crosses the river, so that he who comes from the opposite side sees rising before him the graceful mass of this edifice which occupies and dominates the centre of the panorama.

The Chapel Corpus Domini is not remarkable in an architectural way, and is worthy of mention only by reason of the singular incident which gave it birth. According to tradition, this occurrence took place in the fifteenth century, at the time when the victorious French ranged through the valley of Susa and savagely ravaged everything in their path. The village Exilles, lying in the road which leads from Mt. Cenis to the capital of Piedmont was one of the places most cruelly misused. A soldier of the army of invasion dared to carry pillage even to the extremity of sacrilege. He took possession of a monstrance containing the consecrated wafer or host, and cast it into a pannier already half-filled with stolen objects. When the donkey upon whom these baskets were loaded reached Turin, he refused to go farther. They flogged him with whips, but in vain. Conquered by pain, he fell on his knees. The monstrance, which was at the bottom of the pannier, burst open, and showed itself to the eyes of the crowd, while the consecrated host detached itself from the frame in which it was fixed, and rose slowly toward heaven. It was in order to preserve the tradition of this miracle that the Commune of Turin erected the Church of Corpus Domini in 1598.

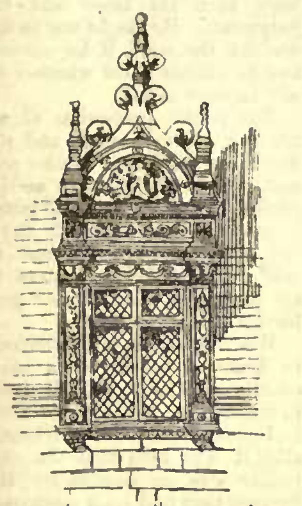
In the number of ecclesiastical buildings which embellish the grand sub-Alpine city, we must not forget the synagogue, which, by its strangely picturesque appearance, gives us the notion of some architectural jewel which the Orient has thrown to Occidental lovers of art. In form it is a parallelopiped, and the four corners are flanked by square towers ornamented by an open belfry, and crowned by a Turkish cupola terminating in a point. Windows and porches are full-centred, but the arch is contracted at the point where it touches the pilasters, just as we see it in Venice in all the monuments where the Arab manner has persisted.

The only open place in Turin which has a truly monumental air is that of San Carlo. The church which gives it its name is formed of two façades, which occupy the extremity of the Via Roma, and form one of the sides of the place. Each of the façades presents a curious mixture of different styles. Statues are mixed up with columns, and the cornice lines are broken from point to point by marble torch-holders, which make the whole design heavy. Detail is lacking in purity, but the whole mass has a sufficiently decorative air. The other sides of the square are enclosed by vast porticos, where the people walk freely, and whose symmetrical disposition greatly pleases the eye. These arcaded constructions are one of the specialties and beauties of Turin. We find them everywhere, and we come upon whole streets — the Rue Po, for example,

built after this pattern, which offer a pleasing aspect without sacrifice of utility. In truth, during the summer the inhabitants find beneath them shade and freshness, while during the cool season they seek under them a protection against the rain, snow and bitter northeast wind from the Alps. We may almost say that the life of the inhabitants unrolls itself entirely under these porticos: it is here they give rendezvous for business, and here that one is sure of finding at a definite hour every day those persons of a certain mark in the procession of daily existence. It is here those who are out of work come to while away the time, and break the monotony of their idleness; and here the poets come to dream and give their imaginations a breathing space. H. MEREU.

[To be continued.]

SOME GENERAL OBSERVATIONS ON THE STRENGTH AND STABILITY OF MASONRY.[1] — II.



Chateau du Rocher à Mézanger. France

AS to numerical values, the crushing strength of natural stones, tested in the form of cubes, ranges from 4,000 lbs. per square inch for soft sandstones, to 25,000 lbs. per square inch, the strength of some granites and slates. These are about the extreme values met in stones which find their way into general use; it is not probable that this exceptionally high limit of strength is often reached and those of less strength than above mentioned would hardly be regarded as suitable building material in the absence of tests indicating their quality. It will be understood that the strength here referred to has been displayed by material tested under the most favorable conditions for developing high resistance, and if a comparison is made with material tested under other conditions, the fact should be duly considered. Granites of good average quality range in strength from 12,000 to 25,000 lbs. per square inch. Limestones and marbles average between 8,000 and 16,000 lbs. per square inch, with exceptional quarries furnishing stones which reach 22,000 lbs. per square inch. Sandstones range from 4,000 to 16,000 lbs. per square inch, some of the strongest reaching 22,000 lbs.

The investigation of the gain in strength of those stones which are soft and easily worked when first quarried, but which harden during seasoning, has not been undertaken, neither has the effect of hammer-dressing on the surface of the stone been inquired into, although it is very probable that some stones may have had their strength impaired by rough treatment during dressing.

The crushing strength of bricks has been found to range between 5,000 and 22,000 lbs. per square inch, although the strength commonly met is between 10,000 and 16,000 per square inch. Those which had the highest strength were common hard-burned bricks, the softer face bricks gave the lower results. The degree of hardness to which the clay is burnt, at least within limits, exerts a decided influence upon the strength of the bricks, the strength increasing with the hardness.

The range in strength of cements and mortars extends from say 8,000 or 9,000 lbs. per square inch for very strong neat cement down to about 150 or 100 lbs. per square inch, the strength of lime mortar. Intermediate values are found with different compositions of cement and lime mortars and concretes. From the wide range in strength which these materials cover, it will be seen that ample strength exists to meet every reasonable requirement. In order, however, to obtain suitable material in particular cases when a work of great importance is undertaken or where exceptional strength is needed, recourse should be had to experiments on the particular material selected for use.

The compressibility of the material under stress and its resilience when the stress is removed has been referred to, but it is desired to emphasize the importance of giving this feature special attention. In most engineering works the elastic properties of the materials are receiving due consideration, but in the matter of masonry they seem to have been almost entirely neglected. Without implying that knowledge of the ultimate strength is of secondary importance or undertaking any comparison of the relative importance of the several physical properties which obviously vary with changes in the controlling conditions for each particular case, nevertheless, it is of the highest importance to fully understand the behavior of the material within the ordinary working limits, where the elastic properties are the principal ones which are brought into action and about which a knowledge of the ultimate strength alone furnishes no clue. It is desirable to know the effect of each successive load from the commencement up to the time of rupture whenever it is practicable to obtain this, although in ductile materials, having a well-defined elastic limit, there is much uncertainty of behavior between the elastic limit and the ultimate strength. In this respect the behavior of stone is not more complex, perhaps somewhat less, than that of metals.

The moduli of elasticity in the test of the brick piers were found to range from about 700,000 to 2,400,000 lbs. per square inch, depending upon the kind of mortar used in laying the bricks. These values represent the behavior of the bricks and the mortar taken together, without indicating the values of the two taken separately, but from other tests on strong cements and mortars wherein the modulus of elasticity was found between the limits of 1,000,000 and 2,800,000 lbs. per square inch, it may be inferred that the higher values of the moduli of the piers closely indicate the values both for the mortar and for the bricks, and that the lower values in the piers are still rather high for the modulus of weak lime mortars alone.

From a limited number of experiments the following values have been obtained: Sutherland Fall, Mass., marble has shown a modulus of nearly 8,000,000 lbs.; serpentine from Lynnfield, Mass., about 5,000,000 lbs.; some exceptionally-strong red sandstone, 5,000,000 lbs.; other sandstones, weaker in strength and of lower specific gravity, gave moduli from 1,500,000 to 1,800,000 lbs. Experiments have not shown any decided difference between the modulus of elasticity of cement mortar composed of cement and sand and concrete made from it by the addition of broken stones. When a difference happens to exist, there is usually a slightly higher modulus for the concrete as might reasonably be expected, on account of the stones themselves possessing greater rigidity than the mortar.

When structural iron and steel is loaded above the elastic limit by either tensile or compressive stresses, there is ordinarily considerable display of ductility before the ultimate strength is reached, but not so with the materials of masonry. Although there is a certain amount of compressibility in stones including the elastic movement and the permanent set, and sufficient at times to clearly indicate impending rupture, still, as compared with ductile metals, the compressibility is small. The total amount which the different materials of masonry may be compressed previous to rupture range between the limits of about .10 and 1.00 per cent, although by far most material fails when it reaches a total compression of .2 to .7 per cent. We have examples of neat cements failing when the compression amounted to .34 per cent, other cement reaching .60 per cent. Cement mortars have failed with .2 to .4 per cent compression. Concretes have shown a somewhat greater compressibility than their mortars. Some lime-mortar cubes displayed a range of compressibility between the limits of .30 and .75 per cent. Natural stones of different strengths and densities are found to extend over nearly the whole range of compressibility first mentioned. The large compressibility observed in some brick piers laid in lime mortar, where over 1.2 per cent has been reached, of itself indicates that the mortar had been crushed some time before the maximum strength of the pier was reached, which is further confirmed by the appearance of the disintegrated mortar, and furthermore, the strength of the piers largely exceeded the strength of the mortar when the latter was tested in the form of cubes.

As to the modulus of rupture of natural stones under transverse stress not much can be said; experiments are comparatively few. In exceptional cases of remarkable strength, a modulus of 3,000 lbs. per square inch has been reached, although it is quite probable that moduli considerably below 1,000 lbs. are those frequently met in ordinary building stones. These are general values which have been stated, but they fairly indicate what may be expected of this class of building material.

In regard to the practical application of these results of experiments, it is clearly seen wherein attention should be given to certain details in order to secure the uniform distribution of stresses which, in the execution of a well-designed structure is one of the chief features to be attended to. First of all, the foundations obviously require careful attention, the functions which they are required to perform being peculiarly difficult. Occupying a place between a very compressible and heterogeneous mass on the one side, they are expected to receive from the other side loads differing widely in magnitude and in all sorts of places, and must possess sufficient strength and rigidity to transmit and distribute these unequal loads from the mass above without serious distortion. The efficiency of foundations will generally be best when large stones are used in the lower courses, with close joints of uniform thickness, using neat cement for the mortar. The use of large stones lessens the danger of failure by transverse and shearing stresses. To obtain close joints of uniform thickness means flat bed-and-build surfaces by reason of which compressive stresses are uniformly distributed, and the use of strong neat cement gives the nearest approach to the same modulus of elasticity in the joints as in the stones. Such a wall will act as a whole and not as an aggregation of individual parts. Some situations might even make it desirable to employ rolled-iron beams in places where otherwise there would be a lack of rigidity.

It is not always possible to so proportion the sizes of brick piers that the pressures per square inch shall be the same where different loads are carried by different piers, the fixed dimensions of the bricks preventing. Where the loads differ, the compressibility of the piers will be correspondingly unlike unless compensated for by the use of several mixtures of mortar, which, as we have seen, is a convenient method by which the elasticity and compressibility of the

[1] Continued from page 93, No. 635.

pier may be varied within limits. Piers which carry the same loads and differ in height may in the same manner be adapted to their work when it is desirable to have their total compressibility nearly alike. It is not expected that these means will be adequate to secure a strictly-uniform distribution of loads and allow the superstructure precisely the same settlement throughout, due to the action of stresses, but something in this direction may be accomplished.

Bearing in mind the different moduli of elasticity of bricks, stones and of mortars, we can understand the reason why an exterior wall with one kind of facing and another kind of backing is not the best adapted to sustain large pressures, disregarding for the time being the initial strains which result from the setting of the mortar. Parts of walls which are more severely loaded than others, such as arches, require bricks and mortar of extra rigidity. Illustrations might be multiplied, but the fundamental principle consists of the attainment of a uniform distribution of stresses and the uniform elastic resistances of those parts which should act together; having done this, it is improbable that ordinary structures, as commonly designed, will exhibit disfigurement, much less be in danger of true crushing of the material.

That masonry under some conditions will endure great distortion was shown by the loading of an arched floor at the Watertown Arsenal. This floor was about 29′ square and was made of five 15-inch I-beams, 200 lbs. to the yard, carrying brick arches. The beams were 7′ 4.8″ apart on centres, and rested on brick walls 28′ 6″ apart. The rise of the brick arches was 8.5″. Common, rather soft-burned bricks were used, laid on edge with lime mortar. The arches were backed with concrete and planked over. The maximum load carried by this floor was 563 lbs. per square foot, which amounted to a total load of 118,760 lbs. on the middle I-beam. This load caused a gradual and continuous yielding of the beams, which was allowed to continue till the floor was deflected a distance of 13 07″, measured at the centre of the middle beam under the reduced load of 468.88 lbs. per square foot of floor area or 98,884 total lbs. on the beam. Reducing the load still further, to 110.38 lbs. per square foot, the deflection was reduced 2.27″ or to 10.8″. The brickwork endured this great deflection and apparently would have stood much more without failure; the yielding of the iron beams determined the ultimate strength of the floor. While this flooring, which stood in an open area, was being tested, a diurnal variation in its height during clear weather was observed. Measuring from bench-marks in the ground to the under side of the 15″ I-beams, it was noticed that, without change of load on the floor, the east side during the forenoon would rise perceptibly, at noon the south side would rise, and during the afternoon there was a corresponding elevation of the west side. This movement was caused by the greater expansion of the parts shone upon by the sun over those parts in the shade. When the sky was clouded and the temperature of the different parts of the flooring and supporting walls were substantially the same, this movement did not take place. J. E. Howard.

THE ILLUSTRATIONS

[*Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.*]

THE POTTER BUILDING, BOYLSTON ST., BOSTON, MASS. MR. S. J. F. THAYER, ARCHITECT, BOSTON, MASS.

[Gelatine print, issued only with the Imperial Edition.]

MARION SOCIAL CLUB-HOUSE, MARION, MASS. MR. WM. GIBBONS PRESTON, ARCHITECT.

THIS building is to be erected during the coming summer by the people of this little seashore town on the shores of Buzzard's Bay. The place is largely peopled by summer guests during the warm season — and as the second floor furnishes a convenient hall for their private theatricals and musicales, the cost of construction will be largely contributed to by their subscriptions. The means of exit from the hall are ample, there being two staircases and a wide exterior fire-escape. The lower story is divided conveniently for the native residents who are members of the club, and provides a place for the book-club, a reading-room, smoking-room, etc. The open fire and supply of current literature never fail to exert a good influence during the winter days and evenings.

A BACHELOR'S HOME, ST. LOUIS, MO. MESSRS. EAMES & YOUNG, ARCHITECTS, ST. LOUIS, MO.

THE building is built of Grafton limestone and is finished throughout in quartered white oak. Cost of building was about $15,000.

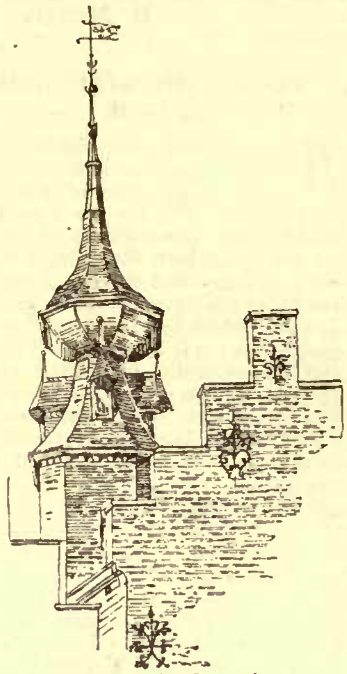
UNITED STATES POST-OFFICE, SPRINGFIELD, MASS. MR. W. A. FRERET, SUPERVISING ARCHITECT, WASHINGTON, D. C.

COMPETITIVE DESIGN FOR THE ROMAN CATHOLIC CHURCH OF ST. AUGUSTINE, BROOKLYN, N. Y. MR. R. L. DAUS, ARCHITECT, BROOKLYN, N. Y.

UNITED STATES COURT-HOUSE AND POST-OFFICE, LOS ANGELES, CAL. MR. W. A. FRERET, SUPERVISING ARCHITECT, WASHINGTON, D. C.

CHURCH, CHAPEL AND PARISH-HOUSE OF ST. JOHN'S, JAMAICA PLAIN, MASS. MESSRS. APPLETON & STEPHENSON, ARCHITECTS, BOSTON, MASS.

LAW IN RELATION TO ARCHITECTS.[1]


House at Cuypers.

EVERY person who professes to be a skilled workman impliedly undertakes to do his work well according to the rules and principles of his art. When a person is employed in a work of skill, the employer buys both his labor and his judgment. He ought not to undertake the work if he cannot, and he should know whether he will succeed or not.

The public profession of an art is a representation and undertaking to all who require and make use of the services of the professed artisan, that the latter is possessed of, and will exercise the ordinary amount of skill and knowledge incident to his particular craft, art, or profession. (Ad. Cont.)

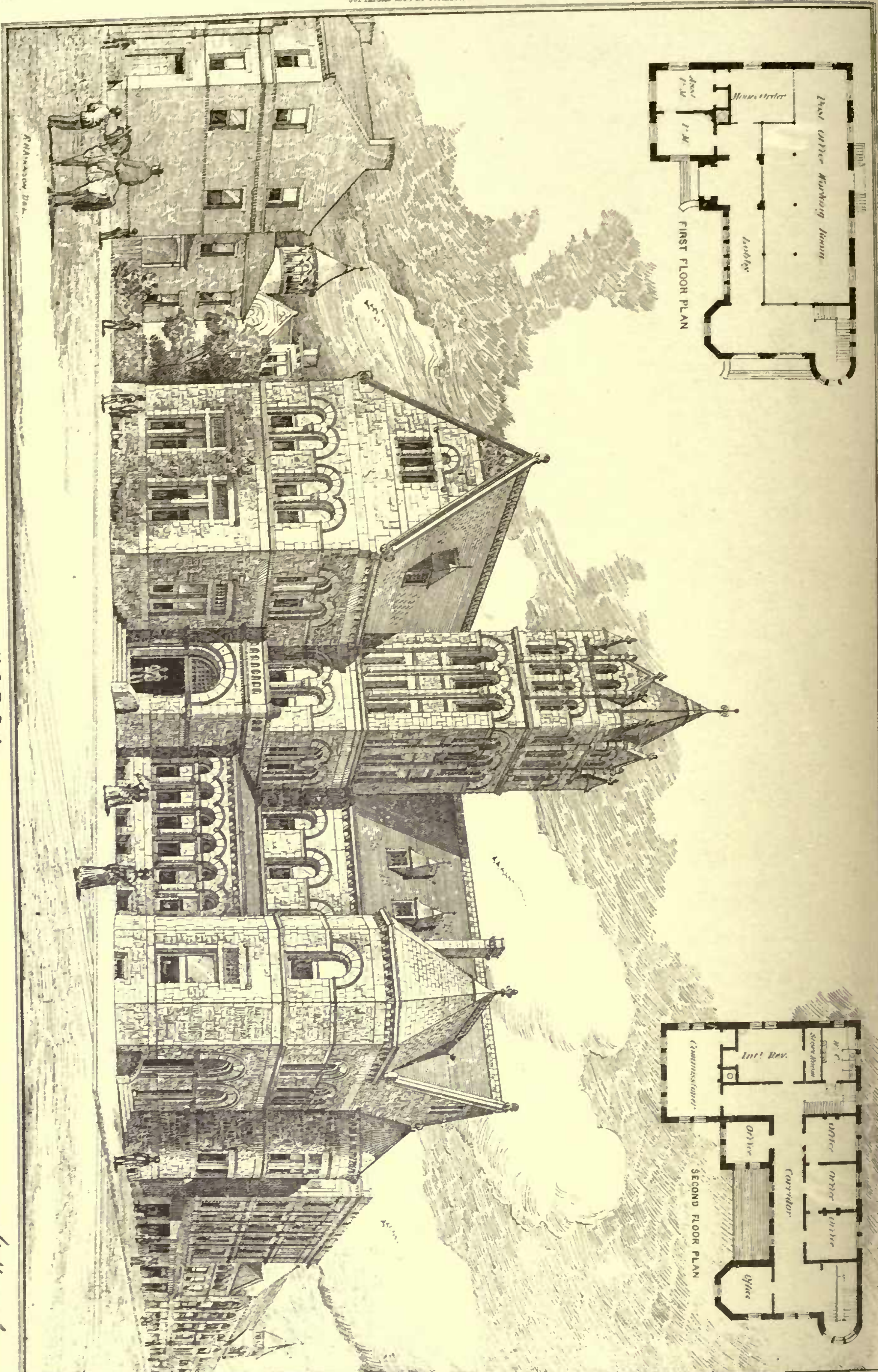
Where a carpenter undertook to build a booth on a race-course, and the booth fell down in the middle of the races from bad materials and bad workmanship, it was held that the carpenter was responsible for the damage that had been sustained. If it could have been shown that the booth had been put up under the supervision of an architect, and that the accident had arisen in consequence only of erroneous principles of building construction, it may safely be averred the liability would have been with the architect. (Ad. Cont. 676.) But if any employer wilfully selects unqualified persons, he cannot have any remedy from them, although they may make mistakes, if they have done their best, notwithstanding that the consequences may be very serious; or, to put the matter more clearly, in the words of an eminent jurist, "If the employer voluntarily employs in one art a man who openly exercises another, his folly has no claim to indulgence, and unless the latter makes false pretension for a special undertaking, no more can be demanded of him than the best of his ability."

An architect or, as he is generally called by legal writers, a surveyor, is bound to exercise reasonable care and skill in executing the work committed to him, and should he neglect so to do, he is not entitled to recover anything for his work. In the case of Moneypenny *vs.* Hartland and others (1 Car. and P. 352), the defendants were a committee for building a Mythe bridge across the Severn. They employed the plaintiff as architect and engineer to the work. He sued them for his fees, but they resisted payment on the ground that though he made an estimate for the bridge, yet he did not examine the soil of the foundation, which was afterwards found to be bad, which caused an additional expense of £1,600, to which the surveyor replied that the defendants themselves had told him that a person whom they named would assist him with information, and that that person had informed him (the architect) that the soil was good; but he admitted he had not himself tried it in any way. The Lord Chief Justice Abbott said, "If a surveyor who makes an estimate sues those who employ him for the value of his services, and it appear that he was so negligent that he did not inform himself by boring or otherwise of the nature of the soil of his foundation, and it turned out to be bad, this goes to his right of action (that is, defeats it); and if he went upon the information of others, which now turns out to be false or insufficient, he must take the consequences, for every person employed as a surveyor must use due diligence; and if the plaintiff went on the information of others, that is no excuse."

A warning was conveyed in Jenkins *vs.* Betham, 15 C. B. 168, to surveyors and valuers when acting in respect of property of a nature to which they are not accustomed. In the case just mentioned the exact point decided was that one who holds himself out as a valuer of ecclesiastical property, though he is not bound to possess a precise and accurate knowledge of the law respecting the valuation of dilapidations as between outgoing and incoming incumbent, is bound to bring to the performance of the duty he undertakes a knowledge

[1] A paper read before the Manchester Architectural Association on Tuesday, February 7, by Mr. Edgar Atkins, solicitor, of Manchester, and printed in *The Architect.*

COPYRIGHT 1888 BY TICKNOR & CO.

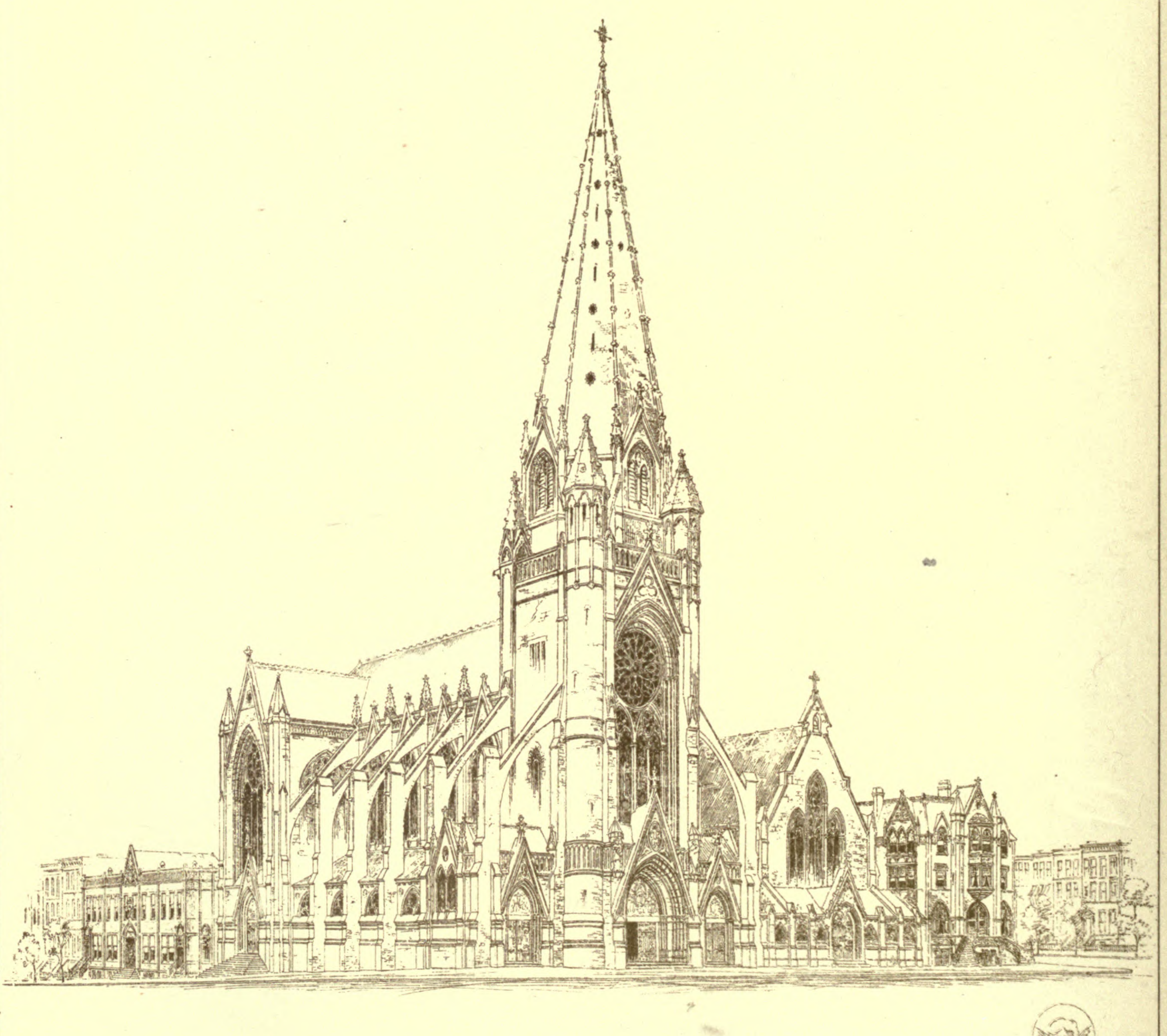


U.S.P.O. &c.
SPRINGFIELD, MASS

Heliotype Printing Co. Boston.

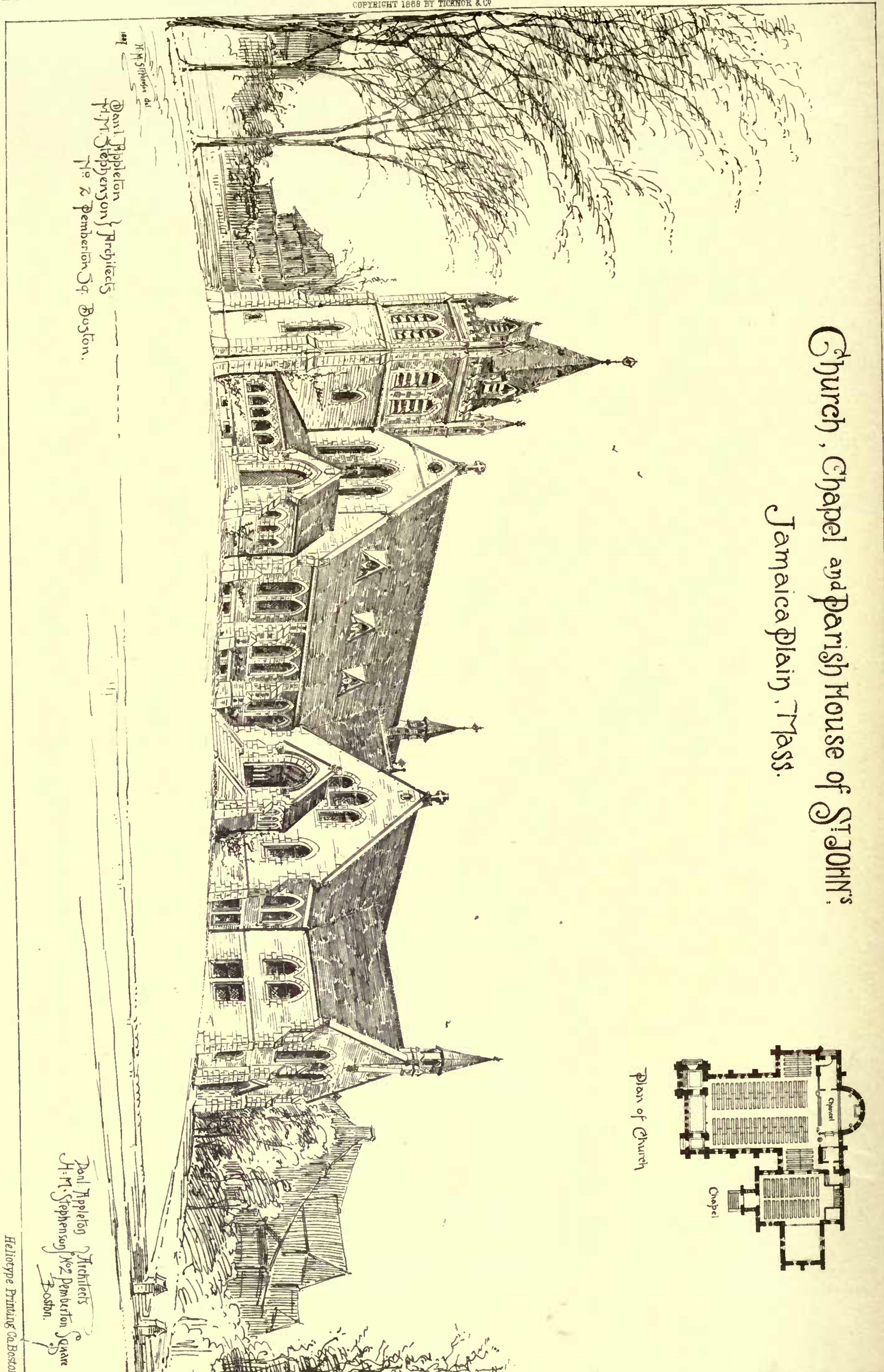
COPYRIGHT 1888 BY TICKNOR & Co.

Competitive Design for . . .
R·C·CHURCH OF
ST AUGUSTINE ✠
. . . BROOKLYN .
R·L·DAUS · Architect N·Y·

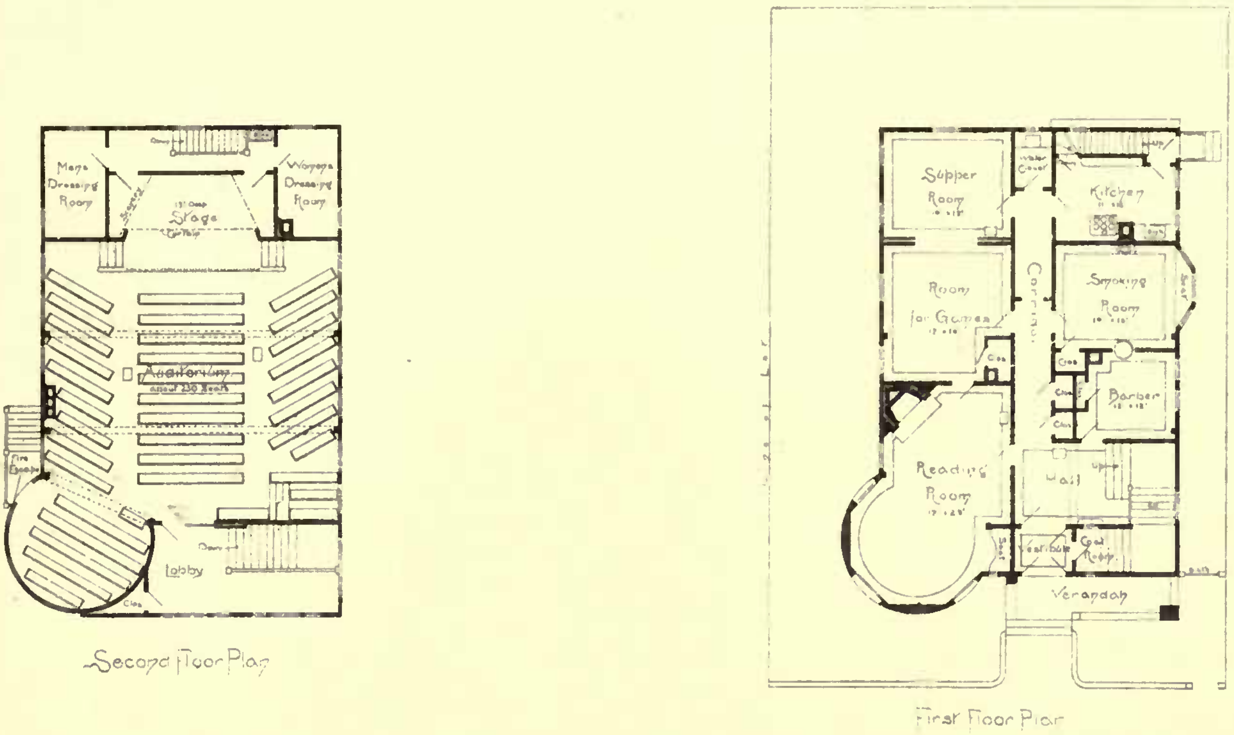


Heliotype Printing Co. Boston.

COPYRIGHT 1888 BY TICKNOR & CO



AMERICAN ARCHITECT AND BUILDING NEWS, MAR. 10. 1888. No. 637.
COPYRIGHT 1888 BY TICKNOR & CO



MARION · SOCIAL · CLUB ·

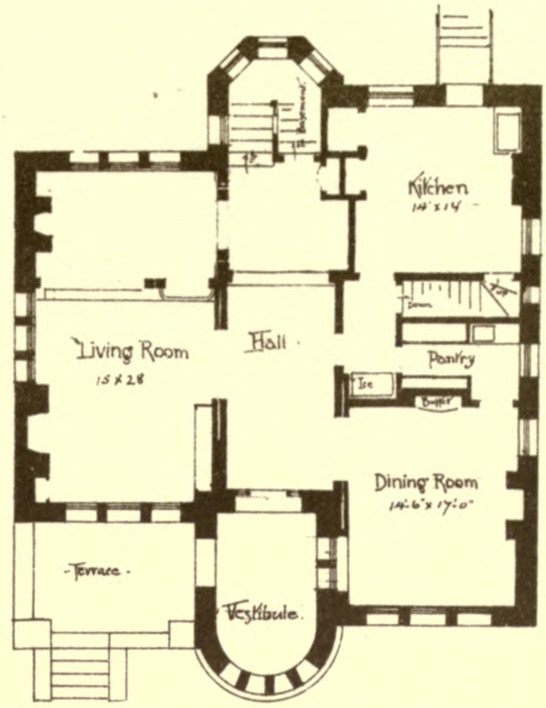
W^m Gibbons Preston, Architect

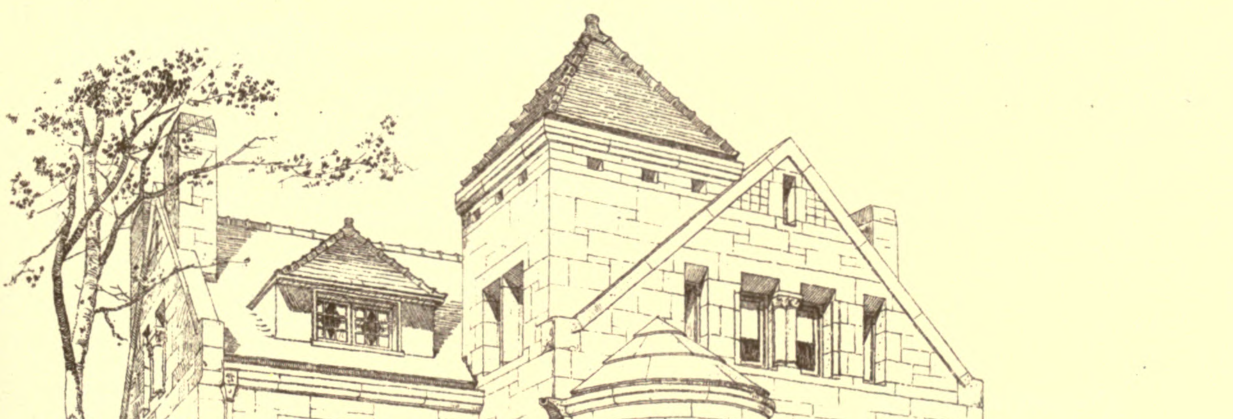
W^m Gibbons Preston, Architect et del.

MARION · SOCIAL · CLUB · 1888 ·

Heliotype Printing Co. Boston.

COPYRIGHT 1888 BY TICKNOR & Co

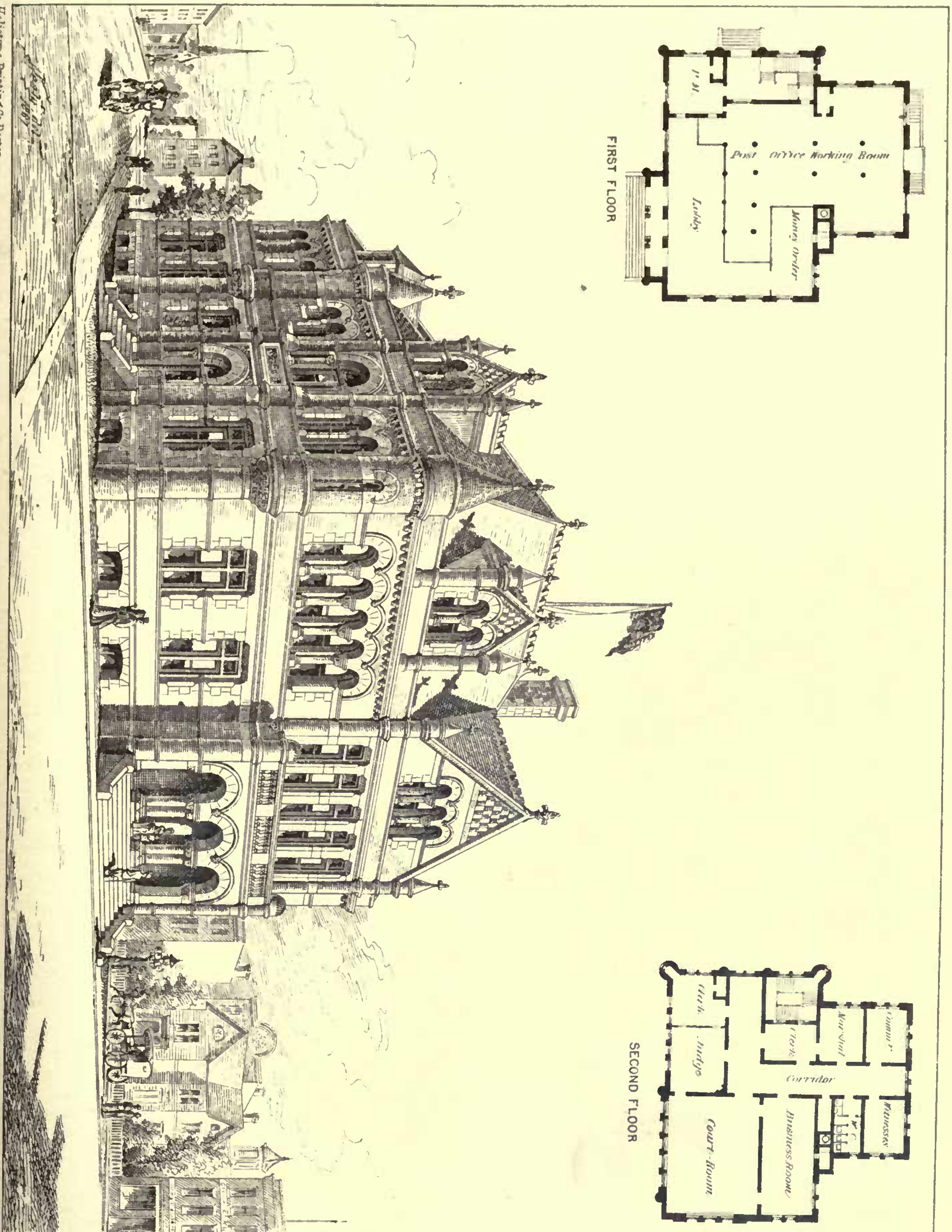




J. C. Young del.

A BACHELOR'S HOME IN St: LOUIS Mo:
Wm: S: Eames AND Thos: C: Young Architects

COPYRIGHT 1888 BY TICKNOR & CO



Heliotype Printing Co. Boston

U. S. C. H. & P. O.
LOS ANGELES, CAL.

WILL. A. FRERET
Supervising Architect

of the general rules applicable to the subject, and of the broad distinction which exists between the cases of a valuation as between incoming and outgoing tenant, and a valuation as between incoming and outgoing incumbent.

Another way of putting the point is that the surveyor must be acquainted with any special knowledge which the particular subject of valuation may necessitate.

The case of Jenkins *vs.* Betham just referred to, is quoted by legal writers as an authority for the proposition that a surveyor is liable for the results of his ignorance. There is, no doubt, that he is equally liable for his neglect. Suppose, for instance, a merchant contemplated storing a large quantity of china in a warehouse, and prior to so doing the flooring boards are removed to enable a surveyor to inspect the joists, who, in so doing, omits to observe that they are rotten, he would certainly be liable for any damage resulting to the merchandise in consequence of the condition of the premises.

Surveyors have a most responsible duty to perform when valuing property on behalf of trustees who contemplate lending trust-funds thereon. In the case of Budge *vs.* Gummow, 27 L. J. R. N. S. 666, a London surveyor was employed to value hotel property at Broadstairs. In delivering judgment, L. J. James said, "How could a London surveyor going down to Broadstairs form any estimate of the value?"

Mr. Justice Kay, in a judgment delivered on August 1, 1884 (Fry *vs.* Tapson, 51 L. J. N. S. 325), in a case in which the propriety of a trustee's investment in property in Liverpool was in question, says, "The most incautious act was to employ Mr. ——, of —— & Co., surveyors, land-agents and auctioneers, London, to value for the mortgagees, and to accept his report as sufficient evidence of value." He was a London surveyor, not shown to have any of that local knowledge which was so important in this case, and his employment was inexpedient for that reason.

Clearly, therefore, it is a surveyor's duty to point out to his client that a valuation made by him of property out of his own district is liable to objection, if questions as to the propriety of the investment should hereafter arise.

When trustees contemplate investing in property recent cases have established that the surveyor should be instructed at least as follows:

1. The proposed investors are trustees purposing to invest trust funds.
2. You should ascertain that the particulars of the property given to you are a perfectly correct description of it.
3. You should ascertain its minimum value.
4. Its nature for letting purposes.
5. What are its present rentals, and whether they are such as are likely to continue to be obtainable.
6. Not only should the rentals stated in the particulars be checked, but your opinion of the letting value of the premises should be considered and stated.
7. The amount of the rates and outgoings should be ascertained and stated.
8. Whether or not all the property is let should be ascertained and stated.
9. You should give your consideration to the average amount of repairs which the property is likely to require.
10. It should be borne in mind that should the investors have to take possession, they would have to employ a collector and manager of the property.
11. The possibility of the property being tenanted without regard to the fluctuation of trade should be considered.
12. If any special circumstances affect the property, mention thereof should also be specifically made.

It is laid down by very high authority that the office of an arbitrator (to which members of your body are so frequently appointed) is deemed to be an honorary office, and a person who acts as such cannot charge for his services, unless it appears from the terms of the submission or the surrounding circumstances of the transaction that it was the intention of the parties that the arbitrator should be paid for his time and trouble, or unless there was an express promise to pay him for his services. (Ad. Cont. 661 *f.*)

It may be doubted, however, whether or not that is still the law, because in a recent case — Crampton & Holt *vs.* Ridley & Co. (*Law Times Reports*, February 4, 1888) — Mr. Justice Smith says: "If the point ever comes to be decided by a court of review . . . it will be held, and I believe the law to be that . . . there is an implied promise to pay the arbitrators and umpire."

The remuneration payable to surveyors does not even yet appear to be definitely fixed. It is a matter of common knowledge that for supervision of buildings it is usually on a percentage scale, but an inquiry into the cases would not justify an assertion that the law was that they should be so paid. In the case of Upsdell *vs.* Stewart (Peake), 255, the plaintiff claimed £34, being £5 per cent on all money charged by and allowed to the tradesmen. The defendant had paid one-half of the sum demanded into court, contending that two-and-one-half per cent was a sufficient compensation for the business the plaintiff had done. He had done nothing more than measure the work and settle the bills, not being at all employed in building the house. Plaintiff's counsel offered to call witnesses to prove that the uniform practice of surveyors was to charge £5 per cent on all money allowed to the workmen, but the Chief Justice, Lord Kenyon, said, "The plaintiff is entitled to a reasonable compensation for his labor, but he is not to estimate that by the money laid out by the defendant in finishing his building. As to the custom offered to be proved, the course of robbery on Bagshot Heath might as well be proved, in a court of justice."

But now observe the case when the work had been done under the supervision of the architect. In the earlier trial, Chapman *vs.* De Tasht, in which the question was whether the plaintiff, who had been employed by the defendant as surveyor in superintending certain alterations in his buildings, was entitled to a commission of five per cent on the sums laid out as surveyors, although evidence was given that such was the usual mode of charging for business of that description, Lord Ellenborough declined to lay it down as law that such was a proper basis of charge, but, to use his own words, he left it to the jury to say whether this mode of charging was vicious or unreasonable, and, if they thought it was, to deduct accordingly. The jury found a verdict for the plaintiff for the full amount claimed. It would seem, perhaps, to the lay mind that this case established the right of the profession to payment on a percentage scale. But that is not so. We must bear in mind that the legal effect of Lord Ellenborough's action when trying the case was the same as if he had said, "Gentlemen of the jury, the law is not that a surveyor shall be paid five per cent commission, but it is that he shall be paid a reasonable sum, and if in your judgment a sum calculated on that basis is unreasonable, you may bring in a verdict awarding the plaintiff a smaller sum."

The practice of surveyors[1] to charge on a percentage scale has been so long established, that it may be predicted a defendant would have the greatest difficulty in defeating a claim so computed. That an architect is entitled to be paid fees for acting as a skilled witness has been long established. A person, may, however, by express agreement not only render the amount of remuneration which is to be paid dependent on the amount of contingent benefit to be derived by the employer, but he may defer the period when his right to receive the reward shall accrue until the employer has actually obtained a given advantage. (Ch. Cont.)

In Paine *vs.* Guardians of Strand Union (8 Q. B. Ad. & Ell, 326) it was held that the guardians of a poor-law union could not bind themselves by a contract without seal, if they could in any manner contract to remunerate a surveyor for attending as a witness on appeal against a parochial assessment within the union, nor for making a survey and map of the rateable property in a parish forming part of the union.

By 33 & 34 Vic. c. 75 (Elementary Education Act, 1870), s. 30, subs. 1, a School Board shall be a body corporate, having a perpetual succession and a common seal. . . . Subs. 4. Any minute made of proceedings at meetings of the School Board if signed . . . by the chairman shall be receivable in evidence in all legal proceedings without further proof. . . . Subs. 6. The rules contained in the third schedule shall be observed. By section 35, a School Board may appoint a clerk and a treasurer and other necessary officers. . . . By the third schedule, the appointment of any officer of the Board may be made by a minute of the Board, signed by the chairman of the Board, and any appointment so made shall be as valid as if made under the seal of the Board. By a minute signed by the chairman of a School Board and countersigned by the clerk, the plaintiff was appointed architect of the Board, and did work under orders given by subsequent minutes so signed and countersigned and communicated to him. It was held by Mr. Justice Mathew that by virtue of the provisions of the Act he was entitled to receive payment for his services, although the appointment and orders were not under seal. (Scott *vs.* Great and Little Clifton School Board, 14 Q. B. D. 500, 52 L. T. 105.) This case must not be taken as establishing that an architect may safely act for a corporate body without his appointment being under seal; but rather, that if he do so, he runs great risk of having no legal claim for payment.

Whilst it is not intended in this paper to discuss the law either of light or of building contracts, neither of which is strictly within the scope of its title, there are a few points in the latter subject in which the personality of the architect is so distinctly marked, that it will be desirable briefly to refer to them.

In contracts in which the right to receive payment is made dependent on the approval of the architect, no right can be enforced until that approval is obtained. This point has been affirmed in several cases, amongst others, Scott *v.* Liverpool Corporation, and Salford Corporation *v.* Ackers. It therefore follows that in such cases work not done to the satisfaction of the architect cannot be charged for; thus, where the contract was to fit a ship to the entire satisfaction of the surveyor of the Emigrant Commissioners, Mr. Justice Willes, in delivering judgment, speaking of certain disputed work, says that which was first done was not done to the satisfaction of the surveyor, and therefore is not to be paid for under the contract. (Dobson *v.* Hudson, 1 C. B. N. S. 659). The builder would, if the law stopped there, seem to be wholly at the mercy of the architect, but that such is not the case was very clearly established in Scott *v.* Corporation of Liverpool, previously referred to. There the contract provided, amongst other things, that in case of disputes such disputes should be decided by the engineer of the Corporation, and that it should not be competent to the plaintiffs or the Corporation to except at law or in equity to any hearing or determination or certificate of the said engineer, who should not be required or compellable by any proceeding

[1] In this paper the word "surveyor" is generally used for architect.

whatsoever, either at law or in equity or otherwise, to answer or explain any matter touching or relating to any certificate made by him. In spite of this, the plaintiffs commenced legal proceedings against the Corporation and their engineer, and in their bill of complaint stated that a certain portion of the works had been completed by the plaintiffs, but the engineer, acting under the directions and in collusion with the Corporation, withheld his certificate of such completion, and thereby prevented the plaintiffs from recovering payment therefor, and that he also, under the like direction, refused to act as arbitrator according to the terms of the contract, and prayed that the Court might adjudge that the withholding of the certificate by the engineer was a fraud upon the plaintiffs, and that the plaintiffs were entitled to receive such an amount of money as they would have been entitled to if such certificate had been granted. It was contended, on behalf of the Corporation, that the plaintiffs were, by the express words of the contract, precluded from recourse to the Law Courts. Vice-Chancellor Stuart, who heard the objection, at the conclusion of the arguments of the counsel for the Corporation, intimated that he did not require counsel for the plaintiffs to say anything in support of their case, and proceeded to give judgment in Scott's favor, in the course of which he said, "I conceive there is just ground for maintaining such a bill for equitable relief, not only against the parties to the contract, who are bound to pay, but also against the engineer himself. . . . These are allegations of improper and inequitable acts and omissions against the engineer. . . . There is, in this contract, a stipulation which purports directly and positively to exclude the jurisdiction of any Court with reference to the conduct of the engineer, however fraudulent and improper — a stipulation of an extraordinary and improper kind, if it bears the construction contended for by the defendant, the engineer, and in no case in which improper conduct or inequitable conduct on the part of the individual in whose favor a stipulation of such a character is made, shall I treat it as having any operation." It should be added that this judgment was not delivered as the result of the trial of the action, but upon a preliminary application to the Court to refuse to hear it. Ultimately the case on the facts was decided in favor of the Corporation and their engineer. If the architect's certificate is wrongfully withheld, the Court will give relief, not only against the employer, but also against the surveyor, and a stipulation purporting to exclude the jurisdiction of the Courts in respect of his conduct will be set aside. (Ad. Cont. 667.) Active collusion, it would seem, is not necessary to render the surveyor liable to such an action; it may be maintained by the builder if he has fulfilled his contract, and the architect, with full knowledge thereof, has neglected to certify in collusion with the surveyor.

The position of the surveyor under building contracts is that of a quasi-judge, and, whilst protecting his client from imposition by the builder, he must also act perfectly fairly towards the latter, and, if unknown to the builder, the surveyor has a personal interest adverse to him, or acts unfairly, partially, or corruptly, in spite of all efforts to exclude its jurisdiction, the Court will interfere. Thus, in the case of Kimberly *v.* Dick, L. R. 13 Eq. 1, where the facts were that an architect entered into an undertaking that a house should be erected for a sum not exceeding £15,000, including architect's commission and all expenses, and engaged the services of a builder who, without being informed of the undertaking, gave an estimate based on quantities given him by the architect, and entered into a contract with the employer for the completion of the work from the architect's plans and under his superintendence for £13,690, with power for the architect to order extra work, and with a clause providing that all questions between the parties under the contract should be settled by the award of the architect, on a suit by the builder claiming to be entitled to be paid by the employer for all quantities executed by him beyond those included in his estimate, and for extra works, it was decided that on the evidence the architect was the agent of the employer, that his undertaking having been concealed from the builder, the arbitration clause in the contract could not be enforced, and that the plaintiff was entitled to an account for what was due to him for any works executed by him under the architect's direction not included in the contract, and for any works so executed under the contract, the price for which was not therein included, and for any variations made under the architect's direction of works included in the contract.

The principle of this case has been confirmed in those of Kemp *v.* Rose, 1 Giff. 258; Ormes *v.* Beadel, 2 Giff. 166; Pawley *v.* Turnbull, 3 Giff. 70; Bliss *v.* Smith, 34 Beav. 508. In Kemp *v.* Rose, where the facts were very similar to those in the case of Kimberley *v.* Dick, Vice-Chancellor Stuart says that if there was the smallest speck or circumstance which might unfairly bias the architect's judgment, his decision cannot be absolutely binding upon the contracting party.

It was held in Roberts *v.* Watkins, 14 C. B. N. S. 592, that if the architect's certificate is not by the express terms of the contract required to be in writing, his verbal approval is sufficient. The utmost care is required in granting the certificate, because it is said that when once given, the surveyor is *functus officio*, and cannot vary or alter it. (Jones *v.* Jones, 17 L. J. Q. B. 170).

An action will not lie against an architect by the builder for want of skill in ascertaining the amount to be paid to a builder under a contract, if his error be only an error of judgment and is free from fraud or collusion.

Building contracts, says Mr. Addison, have not been construed by the Court to be binding to the letter, so as to enable a land-owner to escape payment for the benefit of the builder's work merely on the ground of a slight deviation, but if it appears that the parties to the contract intended the one to insist on, and the other to submit to, conditions, however oppressive, the Court will give effect to them as illustrated by the cases of Stadhart *v.* Lee, 3 B. and S. 364, 32 L. J. Q. B. 75; Jones *v.* St. John's College, L. R. 6, Q. B. 115.

In Stadhart *v.* Lee, L. J. R. Q. B. 32, N. S. 75, the facts were that, by a contract of work as to certain excavations to be done at so much per cubic foot by the plaintiff for the defendants, the plaintiff agreed to execute the work to the entire satisfaction of the engineer and clerk-of-the-works appointed by the Metropolitan Board of Works, as well as to the satisfaction of the defendants or their agent, provided that if the works should not proceed as rapidly and satisfactorily as required by the defendants or their agent, they should have full power to enter upon and take possession of the works, and pay whatever number of men should be left unpaid by the plaintiff, and might set to work any number of men they might consider necessary, and the amount so paid, and the costs of the men so set to work, should be deducted from whatever money should be due to the plaintiff. To an action for work and labor the defendants pleaded that the work had not proceeded as rapidly as they and their agent required, and that they had therefore acted on the proviso, claiming to deduct the costs so incurred from the plaintiff's demand, to which the plaintiff replied that the works did proceed as rapidly and satisfactorily as the defendants reasonably and properly could require, and that the defendants and their agent unreasonably, improperly, and capriciously required the work to proceed as in the plea alleged. Held, that the intention to be collected from the agreement was, that the defendants, if dissatisfied, whether with or without sufficient reason, with the progress of the work, should have the absolute and unqualified power to put on additional hands and get the work done, and deduct the cost from the contract price payable to the plaintiff, and, therefore, that so long as the defendants were acting *bona fide* under an honest sense of dissatisfaction, although it might be ill-founded and unreasonable, they are entitled to insist on the proviso, and, consequently, that the replication which only alleged that the dissatisfaction was unreasonable and capricious, and did not allege *mala fides*, was no answer to the plea.

If the workman is entitled to payment from time to time as the work proceeds, the destruction of the work before its completion will not deprive the workmen of their hire. But if the contract is an entire and indivisible contract for the building of one house for a specific sum to be paid on its completion, and the edifice is destroyed by lightning, fire, or tempest during the progress of the work, the contractor must stand to the loss and be himself at the expense of repairing the damage (Ad. Cont.)

But if the contract price of the building is to be paid by instalments on the completion of certain specified portions of the work, each instalment becomes a debt due to the builder as the particular portion specified is completed. And if the house is destroyed by accident, the employer would be bound to pay the instalments then due, but would not be liable for the intermediate labor and materials.

The preparation of the contract for the execution of the works is a task frequently undertaken by members of your profession. It must be borne in mind that a man who enters into the work of building embarks upon the most treacherous and stormy of seas and is fearfully and wonderfully in the builder's hands, who is often, perhaps generally, impecunious, and it is therefore necessary, however harsh it may seem, to protect the land-owner at all points. As a rule, the builder does not incur risk of monetary loss from him.

Two points should in all such contracts have careful attention. First, the builder should always be required to deposit a copy of the detail estimate on which the contract is based for the purpose of pricing extras. Secondly, the whole of the conditions should be set out in the contract, and not scattered promiscuously throughout the specification.

This is really a most important matter and it involves the possibility of the two documents absolutely contradicting each other—a state of things fraught with far more serious consequences to the client than the omission of conditions.

The Legislature has in several instances recognized your profession. Time does not allow of an exhaustive inquiry on this point, and two instances must suffice, in both which you are, in effect, constituted judges. Under the Ecclesiastical Dilapidations Act, 1871, the archdeacons and rural deans of each diocese were required to elect a surveyor to assess dilapidations. He is to make a report as to the cost of repairing the same, upon which the bishop may make an order, and if the report be not disputed in manner directed by the Act, the sum stated in the order as the cost of the repairs shall be a debt due from the late incumbent, his executors or administrators, to the new incumbent, and shall be recoverable as such both at law and in equity. By the same Act, power is vested in the surveyor to enter and inspect buildings at seasonable times and within seasonable hours, and by Section 46 the surveyor's certificate of the final completion of the works is conclusive evidence of their due execution.

Under the recent settled Land Act, 1882, if the tenant for life is desirous that capital money may be applied in an improvement of the settled property, the Court may, if it thinks fit, on the report of a competent engineer or able practical surveyor, make an order for the application of the money in payment of the work comprised in the improvement.

BOOKS AND PAPERS.

IF the prime object of the history of architecture is to make clear the lines of growth, and to show how art in general has been influenced by the erection of architectural structures, Mr. Tuckerman's recent history[1] is anything but a success. The main facts of the history of architecture are stated generally as fully as could be expected in a little volume of less than two hundred pages. Besides this, the history is presented in a very readable manner, though for that matter, it must be a poor hand, indeed, which could not evolve an interest from so vast and comprehensive a subject. But the real soul of architecture, the appreciation of the divine fire, which marks the difference between mere building and true art is quite lacking in this work. The author undertook a tremendous job when he started out to write a short history of architecture, and he greatly increased the difficulties of his subject by following essentially the same lines as have been adopted by such exhaustive writers as Fergusson and Lübke. It is a work written to meet the popular desire for knowledge on professional points. It is not in any sense a book for architects or students, though this does not necessarily imply that the work could not be read to advantage by amateurs. The statements are generally correct and the few criticisms which are offered are harmless, if not absolutely warranted, and in so far as it is really a history of the leading facts connected with architecture, it would repay the reading of those who desire only a superficial acquaintance with architecture. As to its influence in moulding the taste of its readers and guiding them to a knowledge and appreciation of what is really good, and why it is good. and what the best work is, the book is absolutely at fault. Nothing of that sort could fairly be expected from so fragmentary a work.

The book is, however, not lacking in some good points in addition to the mere statement of facts. The illustrations, which are very few in number, are well chosen, cleanly drawn, and have the appearance of having been made especially for this work, as they doubtless were. They are far better than one would expect from a book of this description, even though it does bear the name of Charles Scribner's Sons as publishers. The temptation, to a writer on architecture, to borrow nowadays is so strong that few have the strength to resist it, and the result is that the majority of the smaller architectural histories are filled with weak, trashy illustrations, copied from the German, or copied from no source of any value, whose influence is bad where it is not harmless. Mr. Tuckerman has wisely refrained from any general views of buildings, with the exception of a rather poor sketch of the central portal of the church of St. Trophime at Arles. Unless views are thoroughly good they are quite as apt to mislead as to help. The illustrations are confined entirely to a few diagrams of the orders and some well selected plans of the most characteristic buildings of the different epochs; quite enough in number to illustrate the different styles, but not so many as to encumber the volume or bewilder the pupils. We should say, after reading the book, Mr. Tuckerman understands architecture much better than he is able to present it, for the book is professionally trite and commonplace in the extreme, and the subject-matter is treated entirely without enthusiasm or genuine art impulse, though the buildings chosen as types show that the leading ideas of the history of architecture were fully appreciated by the writer, and that his judgment in regard to what to study was not at fault.

It seems to us, that one serious mistake of the work is the attempt to crowd all of modern architecture, including the Renaissance into less than ten pages, while Celtic, Egyptian and Asiatic Architecture occupy together sixty-one pages and the Gothic alone nineteen out of a total of one hundred and sixty-eight. We fancy most readers would prefer to know more about modern work and would be more anxious to understand the Renaissance than to know the exact meaning and significance of certain Druid or Asiatic remains that no one sees or ever cares much about.

IN these days of dilletante amateurs, when every one wants to know all that is to be known about art, a concise architectural history is often asked for. A very good attempt in this direction is a recent work by Miss Beale, a writer who is well known to readers of this journal. The aim of the author is well stated in her own words[2]: "The utmost I hope or wish to do is to give some love of art which will enable the reader to take an interest in the subject, when travelling, which will, in fact, render them intelligent amateurs in the true sense of the word — *lovers of Art*, not in its perverted sense of *bad workmen dabbling in Art*. Life is not long enough to learn everything perfectly, nor in such a subject as architecture is it even needful. To an amateur, a thorough knowledge of the art of construction is no more necessary to a due appreciation of a building than a knowledge of the chemistry of color is necessary to the enjoyment of a fine painting."

With such an aim and such a purpose kept constantly in view, any work on architecture ought to be valuable to amateurs.

[1] "*A Short History of Architecture*," by Arthur Lyman Tuckerman. New York: Charles Scribner's Sons.

[2] "*The Amateur's Guide to Architecture*," by S. Sophia Beale. London: J. S. Virtue and Co.

Miss Beale has been most happy in her division of the subject-matter; indeed, we do not remember to have seen such a division anywhere else, and it commends itself at once for its truthfulness and for the way in which, under a few heads, all architecture is embraced. Her work is divided into six divisions. First, is an introduction, describing in brief the various portions of a building, with illustrations. Then architectual history as a whole is divided into four parts; first, the Trabeated or Beam Architecture, including Egypt, Chaldea, Assyria, Persia, India, China, Japan, Asia Minor, Greece and Sicily. Second, Round-Arch Architecture, including Italy, Rome, Early Christian, Byzantine, Romanesque, Norman and Saracenic. Third, Pointed or Gothic Architecture, and fourth, Renaissance. Miss Beale adds a final chapter of architectual examples, which may be studied in London in connection with her work.

The author tells us that the work originally formed the substance of lectures which were delivered to her art pupils, girls between the ages of twelve and eighteen. It is a little too paternal and dogmatic in some parts, a feature which we fancy would not suit some of our exacting amateurs of to-day in every respect, but, on the whole, it is so easily comprehended and written in so straightforward a manner that no one can fail to appreciate it. It might be said that the work does not show the sequence of architectural growth, and that there is no nice distinction in style maintained, as for instance, when she says that the Arc de Triomphe de l Etoile is a copy of a Roman triumphal arch, without explaining the immense difference in style which separates the two. Perhaps it would not be worth while to delve too deeply into the soul of art while writing an Amateur's Guide to Architecture. Certainly while the work confines itself to the mere descriptions or enumerations of architectural works, it is admirably clear-sighted and logical, but for comments or criticisms upon architectural growth or on questions of taste as regards individual buildings we fancy most readers would not be altogether satisfied with what the work offers. The author would seem to be almost prepossessed in favor of the Gothic as against the other styles of architecture, and like all Gothicists sees good in mediæval work and faults in everything else. For instance, she says, "The simplicity of Greek buildings requires strong effects of light and shade only to be had in a sunny country. If you want to see how gloomy such a building can look without such effects, you have only to walk to the British Museum, the dismalest of dismal London buildings. On the other hand, Westminster Abbey, with its wealth of ornaments exactly suits our dirty and dingy atmosphere."

Most of us who have seen Westminster Abbey are perhaps more inclined to look upon its numerous crockets and carvings as being rather unsuited for resisting the dirt and destructive corrosion of the London atmosphere. Again, an unjust comparison is made in one place by claiming that in Gothic architecture the great object was to make everything, however mean its use, ornamental, while in Renaissance the one idea was concealment, a statement which is only true in a measure and is by no means true in principle or in sentiment. She relates the story from Vitruvius about the origin of the Corinthian capital and the mythological acanthus plant which grew under a basket placed over a tomb. We cannot believe that the Greeks were so feeble in their art growth as to find no better excuse for ornament than would be suggested by such a puerile fable as this. All architectural ornament has been a growth; has never been due to accident or caprice, but has followed just as definite laws as construction or planning, and it surely is not wise, in an amateur's guide, to draw architectural traditions from mere fables.

The work is, of course, much crowded, though the general scheme is so excellent, that the author has been enabled to grasp the entire subject to an extent which is beyond the powers of most writers of this kind of work. But small space is given to modern work. Most students of architecture would be more interested in the things of to-day than in the things of very remote generations. Indeed, we question whether the most successful history of architecture is not to be that which is written analytically, taking buildings and styles as they are and tracing them back to their origin, instead of starting from the fountain head and spreading out over the whole world. However, it is not fair to judge Miss Beale's work by any standards which would be applicable to larger and more elaborate publications. For what it professes to be, it is really excellent, and we would advise all newspaper reporters who desire to know the difference between a round arch and an iron beam, to read Miss Beale's work before they undertake to criticise public buildings.

THE new post-office ruling affecting the admission of "second-class" matter to the mails falls upon the just and the unjust with equal severity, and the public will probably suffer more by an unnecessary ruling than it will gain. This ruling denies the advantages of "pound rates" to various series of paper-covered novels, good, bad and indifferent, which for years have been admitted to the mails at such a rate that the public could obtain reading-matter at a rate which it will not be possible for publishers to furnish it at so long as the present ruling holds.

However hardly this ruling may bear on the publishers whose issues are of a general and miscellaneous type, such as those published by Harper & Bros., Ticknor & Co., Houghton, Mifflin & Co., there are other less known publishers who have made use of the pound rates in a way that is deserving of special protection, and we believe

that *Cassell's National Library* is one and the "*Elzevir Library*" is another. One of the latest things undertaken by the publisher of this "*Library*" is "*Alden's Manifold Cyclopœdia*,"[1] parts of which are now and then issued in this form. Judging by the specimens before us this "*Cyclopœdia*" will be not only extraordinarily cheap but the publisher may well claim that great pains have been taken to make the articles accurate and full. Of course, one cannot expect to get extra heavy paper and fine binding when he undertakes to buy for less than ten dollars the thirty volumes of five or six hundred pages each that the publisher offers, but the paper is good enough for the money, the type has certainly a good and clear face, and the meagreness of the margin simply makes the book easier and lighter to hold in the hand. It looks as if with sufficient support the publishers might be able to produce a good "*Cyclopœdia*," which would be cheap enough for most of us to own.

[1] "*Alden's Manifold Cyclopædia.*" New York: John B. Alden, publisher.

COMMUNICATIONS

DECORATION OF McVICKER'S THEATRE, CHICAGO.

CHICAGO, ILL., February 25, 1888.

To the Editors of the American Architect:—

Dear Sirs,—I reply at some length to Messrs. Adler & Sullivan's February letter of the 1st, for all they say being not all there is, makes them, I fear, mislead themselves, and I wish to state the manner in which I came to undertake the decoration of this theatre, and what I did to justify my claims of January the 18th in your issue of the 28th.

Personally invited by Mr. McVicker to examine plans at Messrs. Adler & Sullivan's office made for the alterations — the architect's notice coming later in the usual way — I called, but the set of drawings was incomplete, sketches of sounding-boards and boxes having been distributed among other decorators. I learned then and subsequently that plaster panels inserted into wood framing — to form a proscenium front with boxes combined — were to be decorated in connection with the entire interior, which interior needed no plans to see, the changes being slight and then in view. I discussed at length with Messrs. Adler & Sullivan their style, to get its meaning, giving as reasons my desire for coöperation, and, in furtherance of this, together we agreed that this peculiar style demanded soft and gentle color-treatment. Upon deliberation that night, and alone, I mentally measured the ponderous timberings and delicate lines interblended in grotesque oppose, and I turned my mind fixedly to the idea of one ruling tone, changed by light and shade, as the groundwork for my plan. The next morning, in Mr. McGrath's private office, I gave to Mr. McVicker the scheme of color in these words: Start from the floor with a reddish brown and gradually pale to the entire height of the building lighter and lighter, reaching the centre of the ceiling in delicate creams; and I may here say, this was the first occasion on which any scheme of color or system of decoration for the body of the house had been enunciated. Mr. McVicker approved and recommended that I explain this to Messrs. Adler & Sullivan, and such was done on a second visit to their rooms. Neither suggestion, nor idea, nor wishes for this treatment came to me from them other than is here stated. A few days later I obtained two or three plaster panels from a storehouse — they being not yet in place, nor was the building ready to receive them — to serve me as a keynote to designs that were required of me, and from the spirit of these I produced a colored sketch of the ceiling, a small section of the cove proper and I think a bit of the cove under the balcony; ultimately, a variety of ornaments in relief, which will be referred to later, the whole of which culminated in the work as it now stands. To illustrate my scheme of color, a screen covered with raised flock paper was colored in the graded manner proposed, for until then this treatment had never been seen or heard of, and required demonstration. Mr. McVicker awarded the commission for the work to Mr. McGrath (the architect's notice may have reached before or not, I cannot say), and while some trivial change to the ceiling cove suggested by the architects was noted, I may add that these preliminary studies simply served as a basis for operations, that I made many changes as the work proceeded, always without reference either to Messrs. Adler & Sullivan or Mr. McVicker, the work being placed unreservedly in my hands.

My specification contained a full description of this color scheme, somewhat as follows: Color for plaster ornaments in vestibule, red, to mass with the mahogany woodwork, and garnish with fire-gilt bronze; color for foyers, blue and russet and gold in harmonious contrast to the vestibule, and to fully prepare the eye for the burst of red and yellow browns of the auditorium. No such idea, wishes or suggestion appeared in the architects' writings; theirs were the usual stipulations as to number of coats of paint or varnish, and some admonition in a general way not plain in my memory now, nor were they instructive to my idea of what this work should be. These specifications were not criticised or changed in any way whatever by the architects, and it may therefore be assumed that I am the sole author of that scheme of design for the decoration.

The responsibility of the decorator to the owner, however great, is small in reality when compared to that he owes to the architect. The architect it is who formulates a style — if good, it must be reached up to, if bad it should be bettered, quietly and unobserved — not to be lost sight of. In regard to that, it is the aim of every man who builds a house to build it to its use, and when the decorative theme is reached, architect and decorator must be in full accord.

I would ask in the face of my effort to coöperate with the architects, why they seek to disparage such portions of the work as were produced by me? Why are they "caricatures"? Mr. Blackall did not see them as such; on the contrary, he intelligently commends them and gives his greatest praise where I shall prove the architects had no control, for this work covers the ceilings and walls of foyers, staircases and the whole of the auditorium, except sounding-board and boxes.

"The correct statement of the case" is this. The architects designed the proscenium, the boxes and the vestibules, so far as the construction and relief-work is concerned. The placing of the electric-lights in the proscenium and vestibules was arranged by the architects. The building was then handed over to me, the walls being bare, the ceilings bare, the staircases and foyers bare, and every part of the building without color or decoration of any kind. I designed the relief-work throughout the whole portion of the building which they had left incomplete, planned the arrangement of two hundred and seventy-eight electric-lights (adding about one hundred to the "definitely determined" number), conceived the whole scheme of color decoration throughout, including the portions constructed and designed by the architects, and carried out the whole of this work without any personal communication with them whatever, except what I have already stated, or where some question of construction interfered with my advance, their office in the matter being limited to the acceptance of my design, the signing of a contract, and the granting of a final certificate when the work was completed.

The wall-paper design was Mr. McGrath's by purchase and I chose it just as I did the lincrusta-walton and all other materials, without consulting the idea, wishes or suggestions of the architects. The decorator is no less the artist or no less deserving credit for his work, when, to unify the whole, he takes the fabric suited to his want. That this paper was designed by Messrs. Adler & Sullivan, though for no particular purpose and subject to my criticism, may be to their credit. That it was my voluntary act to select it for this work should be to my credit. The skilled decorator chooses what he will and makes his plans; it is that judgment a client buys in this profession. The upholstered dado, following round the walls of the auditorium and staircases to the boxes, with its unique upholstering and trimmings, the draperies in the boxes and all the portières, were controlled by me in both color and design, and the materials were submitted to me to be approved. The makers of the stained-glass windows were sent to me for consultation, and from one end of the building to the other no color was applied unless I saw it and approved. All these functions rightly come within the province of the decorator, and should have been placed in Messrs. Adler & Sullivan's hands if they were the master spirits and recognized authorities. As these details were not controlled by them, though of paramount importance, how can it appear that my original statement is "manifestly absurd" or "irresponsible"?

Yours faithfully, Joseph Twyman.

[Our correspondent's letter, if all put in type, would fill very nearly three pages of this journal, but we hope he will not accuse us of unfair use of the editorial pencil, since we allow him the same number of lines occupied by the statements he refutes. As we believe this matter is of vastly more interest to the disputants than to the rest of our readers and as the statements are clearly irreconcilable, we must ask them to leave the matter an open question. — Eds. American Architect.]

A CORRECTION.

Boston, February 29, 1888.

To the Editors of the American Architect:—

Dear Sirs,—In the "Notes of Travel" from Chicago, published last Saturday, I find an invidious comparison was made between the Rookery Building and the Maller's Building and the building for L. P. Hansen. It was a slip of my own and it was farthest from my intention to say that these latter structures were unsuccessful as compared with the Rookery. The paragraph relating to them should more properly have read, "All the buildings are not as successful in mass and detail as the Rookery, though there are many which are hardly less interesting and worthy of study," etc.

May I ask that you will kindly make this correction on my behalf and oblige C. H. Blackall.

A COLUMN LIKELY TO ESCAPE DRY-ROT.

Toledo, Ohio, February 23, 1888.

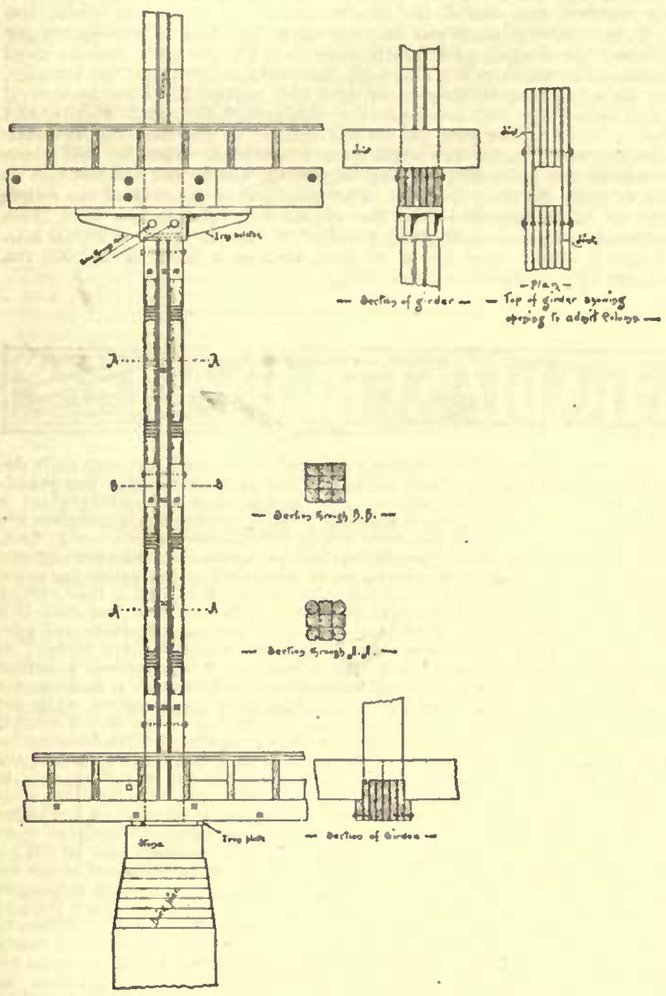
To the Editors of the American Architect:—

Dear Sirs,—Although the subject of "dry-rot" is a very commonplace one, it, nevertheless, seems to demand unceasing attention from all representatives of architectural and building interests. The almost utter impossibility of obtaining large timber of any kind that is absolutely seasoned, and at a price that can generally be afforded in the construction of supports of various kinds entering into warehouse, manufactories or ordinary mercantile building, has rendered

it necessary to devise means of preventing insidious decay and dangerous season-checking.

For girders, etc., the use of two-inch joists, or thinner material, by bolting or spiking together numerous thicknesses, and having thin separating strips between, has long been successfully practised, as has the combination in various ways of partially seasoned material in the construction of wood columns.

I have lately had completed a manufacturing building in which I desired to use 12″ x 12″ oak columns, and it being impossible to obtain dry oak of that size, on short notice, a column was devised, using comparatively dry 4″ x 4″ oak scantlings bolted together, and having interior air-ducts; all fairly well shown in the accompanying sketches. The columns rest directly on top plate of iron bolster,



while the top end of column is received in a recess in bolster, about 1″ deep, and fitting rather loosely.

The result is very satisfactory, not only in the evident impossibility of dry-rot, but a rather handsome column is produced, as well as a very rigid one; while the cheapness of the material, and the ease with which it is turned and dressed, render the column but a trifle more expensive than one dressed and chamfered, or turned from a solid timber with a hole bored through the centre of its entire length.

While I have set forth no new principle of wood-construction, it is presumed that this somewhat novel application of old principles may prove of interest, and, possibly, of benefit to some of your younger readers, if not to certain of the older and more experienced members of the profession. Truly yours, N. B. BACON.

HOW TO APPROACH THE DESIGNING OF THE NEW YORK CATHEDRAL.

NEW YORK, February 18, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs, — The article signed "L" in your issue of February 18th, suggests many thoughts. The difficulties that stand in the way of the erection of the proposed Protestant Episcopal Cathedral in this city no doubt exist, but the statement of them hardly touches the root of the matter.

Why is it that Messieurs A B and C would fail to build an harmonious whole? Why, in the absence of personal discord, would they probably be unable to obtain unity of result from their united efforts?

Is it not because they would be impelled in their task by no common, dominating idea; and the people for whom they built would be as devoid as they of any central thought upon which to hang their lives? Shall men who regard the Nicene creed from a standpoint of historical criticism build temples in honor of the Trinity? or shall readers of "The Bible of To-day" devise friezes enriched with patriarchal legends? Is it not certain, rather, that the work of such men for such a public would show that it was the work, not perhaps of unbelievers, but certainly not of believers? For, however, much men may go to church at the behest of their wives, or as the respectable thing to do, or even from piety where it exists, our age is a questioning age, and in theology to question is to deny.

Powerful as it may yet be in individual minds, the Christian faith is not for us the grand and only impulse of our lives at every moment, as it once was for all decent men over the progressive world. Can we, under such circumstances, expect that the work even of a single man could show the steady devotion to one purpose that the Middle-Age churches show?

To-day, we have no purpose. It is for our own glory that we work, not for the glory of our ideas. At the most, led by admiration of what men have done in past times, we erect our love of the beauty which they created into our deity, we adore Art, for its own sake; sincerely enough doubtless, but never yet did art for the sake of art produce anything worth producing. For all art there must be in us a leading idea, and a desire to express that idea. If the idea be great the art will be great, however unworthy of the idea; and, if the idea be small the art cannot be great art, though to extreme mechanical skill we add the refinements of book-culture and the opportunities of accumulated and concentrated wealth. In the absence of grand ideas we could not now carve even a crucifix that would be worthy of any but an anatomist's regard. Till we can illuminate the dead eyelids with the love of humanity, with which for Giotto they were illuminated, till we can paint in our Madonnas the yearnings of Ezekiel and Jeremiah over their people, and till we carve and paint for a people of whom the very poorest slave's mind is able to appreciate our carving and painting, because possessed by the same leading thought that enables us to create, we need not expect to be able to unify the multitudinous aisles of a great building and give every chisel mark a tongue.

A motive, in the literal sense, is needed for a design; motive for a cathedral church to-day there is none.

We can paint amorini and silk-clad shepherdesses in parlors where an affectation of innocence veils the spice of decent indecency in the talk, but there is nothing grand in our ideas. Heaven forfend! such would be very unbusinesslike sentimentality. Yet there is arising a thought in the minds of men which under cold and repelling formulas conceals a new and hot life, which makes it possible that the human race may once more be overmastered and intoxicated with the frenzy of an all-compelling idea.

The thought is the idea of solidarity.

It is to the interest of each one of us to abstain from injuring others. That is the formula — dry as the binomial theorem — that is to revivify the world.

Let the theologians study it and if they can grasp its meaning and its implications they will find that it is the new phrasing of the world-old love of man that has been phrased anew at every period of reform from Buddha to Jesus. Let them, if they can, throw aside the wornout sanctions for well-doing, that a military age demanded. Let them, if they can, realize that to do well is not now a task, but that, in this age of industry, all we need is liberty to do well. Let them, if they can, feel the throbbing that such words cause in the breast of one who knows what they mean; as the x's and y's of an astronomical calculation excite awe in the mind of him who understands them.

All this they can, if they will.

Let them, if they dare, write over the portal of their church the sign of the Kingdom that is coming, "Liberty, Equality, Fraternity," and they may hope to achieve something worth the achieving.

They will not dare. Strange, that words which separately we revere, thus grouped we shy at!

Yet, short of this, if they will build at all worthily, though less worthily, let them build with walls thick enough to keep out the cold, with windows large enough to admit the light of the sun, so that no great sun will be needed for maintenance to render it fit for occupancy. Let them then throw it open to all sects at all times for their great assemblies. Let the Salvation Army, if it will, fill its pavement with recruits. Let the Anti-poverty Society, if it will, assemble there in some vast corner. Let there be nothing stealable or fragile, but let it be a great covered square, where all may worship what they will and as they will.

Let the projectors go farther than this. In this democratic city there is no forum, no place where any man may speak his mind. In this city, where speech is said to be free, no man is free to speak his mind under the open sky. The homeless, the moneyless, can raise no voice in their own behalf, for a place to speak is essential to the privilege of speaking, and a place to speak must be purchased. Therefore let the authorities build their church over a platform that is entirely free to any man to spring upon and say his say at any time when nobody else is saying their say there.

So shall they be, if not leaders of the advance, yet not laggards where the sutler and canteen bring up the rear; if not reformers, at least not reactionaries; if not teachers of men, as they hold themselves to be: not false guides, blind prophets, purchased organs, as those who they think most need their teachings usually hold them to be. JOHN BEVERLY ROBINSON.

NOTES AND CLIPPINGS

A Substitute for Hydraulic Cement.— According to a statement of a well-known engineer, it is a fact peculiar to Spanish countries that ordinary brick-dust, made from hard-burned, finely-pulverized bricks, and mixed with common lime and sand, is universally and successfully employed as a substitute for hydraulic cement. That engineer says that during an engineering experience of some six years in Cuba, his opportunities were ample for testing its merits, and he found it in all respects superior to the best Rosendale hydraulic cement for culverts, drains, tanks, or cisterns, or even for roofs. In an experiment to test the strength of this product, it was found that a block of it, ½ inch in thickness, without sand, and after immersion in water four months, bore, without crushing, crumbling, or splitting, a pressure of fifteen pounds per square-inch. It is thought that, by the addition of pulverizing-mills to brickyards, to utilize the waste and broken bricks, a profitable manufacture might be carried on. — *Invention.*

Explosion of a Water-heater. — The danger of admitting live steam into closed vessels for boiling or heating purposes, unless they are either sufficiently strong to resist the highest pressure which can possibly be brought to bear upon them, or else guarded in such a way as to render the accumulation of pressure impossible, is one that we have often called attention to, and another fatal illustration of it was afforded in the case of an explosion that occurred on Thursday, the 29th ult., at Messrs. Greterex Brothers' brewery, Moss Side, Manchester. The explosion arose from the blowing out of the flat end of an old discarded steam-boiler which was used as a tank for heating water for washing barrels. The boiler measured about nineteen feet six inches in length by four feet five inches in diameter, and the water was heated by blowing in steam from the ordinary working boilers, which were loaded to a pressure of fifty pounds on the inch. The steam was supplied through a two-and-one-half-inch pipe, the flow being regulated by means of an ordinary wheel-valve three-and-one-quarter inches in diameter. The heating-tank was not fitted with any safety-valve, but there was a small open-ended pipe fixed to one end, the escape of steam from which indicated that the water in the tank had reached the boiling point. As the diameter of this pipe, however, was only one-quarter of an inch, it will be seen that it could be easily overpowered by the supply of steam, and unless care was taken to shut the regulating-valve as soon as the water boiled, there was nothing to prevent the pressure in the tank rising until it equalled that in the main steam-boilers. An examination of the end-plate that was blown out clearly showed that the pressure had been excessive, as the flat ends were bulged, while the pin securing the central longitudinal bolt-stay to the plate which was blown out had been fractured for some time, and was hanging by a mere thread. The angle-ring securing the end-plate to the shell had also been cracked through in many places at the root of about half the circumference. The end-plate, in a word, was in a dilapidated condition and quite unfit to resist internal pressure. As the water was not desired to be heated beyond 212 degrees Fahrenheit, there was no necessity for the pressure to accumulate, and all possibility of its doing so would have been avoided had the escape-pipe been three or four inches in diameter, instead of merely one-quarter of an inch, while the efficiency of the arrangement would have been in no way impaired. At the inquest held on Thursday, the 5th inst., on the body of the man who was killed, the jury evidently were of the same opinion, as they returned a verdict of "Accidental death," adding that "there had been a certain amount of negligence on the part of the firm in not seeing that there was an outlet on the vessel of the same diameter as the inlet." — *Engineering.*

The Vendome Column, Paris. — When the column in the Place Vendôme was erected, a bargain was made with an ironfounder who had never been engaged in bronzework. He, however, had the temerity to undertake the moulding and finishing at one franc per kilo, or say nine pence per two pounds. The Government undertook to deliver to him in guns, taken from the Russians and Austrians during the campaign of 1805, the quantity of bronze necessary for the completion of this enormous monument. The founder used a furnace he had for casting iron, but not being aware of the phenomena of bronze casting, and urged by his vanity to attempt in the first instance the casting of several of the great pieces of the base of the column, he encountered several defeats. Each time he necessarily altered the alloy by oxidizing the tin, lead and zinc, which metals, so oxidized, passed into the scoriæ or were carried off by the current of warm air. He did not perceive this cause of continual loss, and continued to produce the bas-reliefs, but it may be readily conceived that they contained more copper than the bronze of the guns. When the founder had got two-thirds through the column, he found out that he had got no more metal, and being, according to contract, responsible for the metal delivered to him, he was at once ruined. In this lamentable situation he tried to melt up the white metal obtained from the reduction of the scoriæ and a large quantity of refuse metal which he had bought up at a low price. The bas-reliefs which he obtained from the mixture of all these materials were marked with blotches and lead spots; their color, from a dirty gray, became quite black. The authorities refused to receive work so defective, and put his foundry under sequestration. He succeeded, after much petitioning, in obtaining a committee to examine his accounts, which was composed of two chemists, two architects, two mechanical engineers and two founders, with an auditor of the Council of State for the chairman. The weight of each piece delivered by the founder was known; specimens were taken from them, and the proportional parts weighed, from which was made an ingot representing the mean composition of the whole column. It was then found by analysis that it contained eighty-nine parts of copper, seven of tin, and three of lead in one hundred parts. The committee then took specimens of bronze from the guns remaining in the Government stores, and an ingot was formed to represent as nearly as possible the mean composition. The analysis of this ingot gave eighty-nine parts of copper and ten of tin. It was further known that the law of France had fixed the composition of gun-metal at ninety parts of copper and ten of tin per hundred-weight, but that this law was never well executed, and during the Revolution scarcely attended to at all; it was also known that these foreign guns were of a more complicated and baser alloy than the French. Taking all these circumstances into consideration, the committee were of opinion that the founder had produced an alloy, if not superior, at least equal, to that which had been given to him, and that they considered that he could not be charged with fraud in his contract. The chemical operations further explained the whole proceeding; by making separate analyses of the specimens of the great bas-reliefs, the shaft and the capital, it was found that the first had only 0.06 alloy per quintal; the second, particularly towards the upper part, and the third contained as much as 0.21. It was, therefore, evident that the founder, not knowing how to manage bronze, had refined his alloy by several times remelting, and consequently diminished the total weight, and that to make up for this loss he was obliged to put into the last castings the white metal extracted from the scoriæ. Thus he had given bronze of too good alloy in the beginning, which had obliged him at last to make the alloy too low. The moulding of the several bas-reliefs was so badly executed that the chaser employed to go over them removed by chiselling or filing a weight of bronze equal to 70,000 kils. (7 tons), which were given to him, besides a sum of 300,000 frs. (12,000 l.) paid down. — *César Daly.*

TRADE SURVEYS

Business drags a little because prices and values have not been fully determined. Railroad stock and bond speculation halts because of long standing, as well as accidental causes. The expansion in real-estate values is taking a new shape, because a different class of investors and operators are at work. The volume of money is ample for business requirements; first, because there is but little speculation; second, production and exchange are nearly equalized; third, indebtedness, as compared to the producing capacity of the country, is light, and hence less money is needed to take care of it; fourth, because of the general solvency. It is fortunate that corrective agencies are applied, by which evil is averted and complications and mistakes avoided. The business world is just now shouting "low bridge" to itself, and is waiting until the bridge is passed. The agitations apparent on the surface, and the real agitation going on beneath the surface, are widely different. The masses are struggling after opportunities, while the few are seeking to obtain control over the hidden forces, which control the activity and volume of trade and business. In the past, the banking interests controlled. At present trade exercises more control to epitomize the tendency. A few years ago the Grangers feared the power and aggressiveness of railroad corporations, now they fear them less. To-day trade combinations as manifested in trusts threaten the peace of mind of the grand army of business men. To-morrow, so to speak, they will smile at their fears. The trusts are harnessing the great trade interests, and infusing a needed spirit of organization. This tendency and development is too recent to justify such general denunciation. It has a work to do in helping to eradicate or correct commercial feudalism, and establish a higher form of commercialism as was done politically in the transition from feudalism to constitutional government. We are doing in trade what has been already done in the workshop. Individualism may suffer, but the commercial results, when results come to be counted, will be found on the right side. In all branches of business there is a conservative feeling which keep prices pointing downward rather than upward, and which reminds the manufacturer that the margin between sufficiency and overproduction is narrow. The talked-of dulness in trade is due to the instinctive adjustment going on between the great producing and distributing forces of society. In short, the middlemen are casting about them to see that there are sufficient markets to absorb production. This will not take long. Labor might make trouble and delay, but it does not threaten, or manufacturers might, as they have at times, lose their heads and rush madly into overwork, but they do not. They want to see their customer's face and his pocketbook. That which has frequently produced panics has been the disarranging of these two mighty forces of production and exchange, and the undue enhancement of values growing out of the mad zeal of the producing interests. In this point of view the tariff agitation will produce good results. It keeps the manufacturer's eye on the ultimate and creates a sort of leven, within to which the stream of energy and enterprise had best confine itself. The building interests are awaiting the word of command. The greatest activity this year will be in small cities and towns, and in entirely new sections. New industries are being planted in far-off places, and the outflow from the older States of the thrifty population which will seek to establish the surroundings from which it fled for better opportunities, will help, very naturally, to maintain the demand of the past year in the smaller trade channels. A reduction of wages is probable in many branches this year, but employers will not attempt to unsettle schedules The workers in wood, iron, steel, oil and coal will have very little enforced idleness this year. The great manufacturing centres are even now pretty well supplied with actual or obtainable orders. Yet, every one flippantly says, this year wont be what last year was, and this, too, simply because two or three thousand miles less of railroad-building will be done. The premises and the conclusions are not in harmony. The iron and steel mills of the country have not been so short of orders, taking them in the aggregate, for months, but prices are firm and buyers know there is no room for weakness at present cost of labor. The same deduction applies to nearly every industry. Whatever delay shall be encountered will not be due to inflated prices. The machine-shops of the country are generally better employed than for months. The work in sight is encouraging. As so often stated, enormous investment must continue to be made in new directions. The railroad activity of the past three years necessitates a high degree of industrial activity for the next two or three years.

S. J. Parkhill & Co., Printers, Boston.

THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. XXIII. Copyright, 1888, by TICKNOR & COMPANY, Boston, Mass. No. 638.

MARCH 17, 1888.

Entered at the Post-Office at Boston as second-class matter.

CONTENTS

"WOULD say that during the year we had but four inquiries . . . for which we paid $192. We think this very expensive advertising, and have concluded not to continue our advertisement with you." This unwelcome but not unusual statement comes from a firm who insist on tracing a distinct sale to some one advertisement, and where they cannot identify accruing profits with definite advertising outlay they stop that outlay. The simple fact that architects are not *consumers*, and hence that their names do not appear on tradesmen's books as regular and valued customers does more to check the expansion and development of this journal than any other cause, since it diminishes our income and compels us to work with a too-constant eye on the balance-sheet for real ultimate growth and prosperity. So far as we can see the situation is one to which no remedy can be applied. It is not a supposable case that an architect when writing a specification should stop, seize a postal-card and write to a manufacturer: "Have just specified for Mr X's house your goods which you advertise in the *American Architect*," and yet it is only such an act that would satisfy men like the firm from whose letter we quote above, who do not understand the broad and controlling relation that architects hold to the development of the varied and vast industries which are connected with building. As the firm in question manufacture a good and useful article, we have not the least misgiving but that the money they mourn as spent in vain has returned to their till by indirect channels increased tenfold. We think it quite doubtful whether these disheartened advertisers even tried to learn whether the four architects who "mentioned" this paper did or did not cause the introduction of the apparatus advertised in four or even forty buildings in as many different towns. It is in some ways unpleasant to speak of these things, but they concern our subscribers quite as directly as ourselves; so that if any of them find a way to now and then write or speak an encouraging word to our advertisers they can feel that by so doing they are bringing substantial benefit to a trinity composed of the advertiser, themselves, and this journal.

MR. ISAAC D. SMEAD, of Toledo, Ohio, has lately had occasion to write a paper on the recent advance in the science of ventilation, which is quoted in the *Sanitary News*, and contains some excellent suggestions, as well as some remarks at the expense of scientific men, which, although amusing, are open, we think, to a little criticism. Mr. Smead first discourses at great length on the advantage which experience in ventilating school houses gives to "practical men," of whom we suppose he must be one, and then cites twenty extracts from the works of "writers," who, to judge from the extracts, must be chiefly the persons who concoct the advertising circulars of new furnaces, and concludes by demanding whether "any of these writers and talkers ever manufacture a warming and ventilating apparatus," saying that he has "never known of many who could earn forty dollars per month in an office or factory." With all due deference to the wisdom of persons who have had practical experience in the ventilation of school-houses, which, by the way, we supposed were conceded to be the worst-ventilated buildings known to civilization, we feel that we must interpose a word in behalf of the "writers," who are, we infer, reduced to adopting the profession of technical authorship through their inability to earn forty dollars a month in offices or factories. It is true, as we humbly acknowledge, that few of those who devote themselves to the theory of ventilation, the physics of heat, and of the movement of air, have had the opportunity of manufacturing a warming and ventilating apparatus, and "setting it in operation with their own money," but it is not impossible that this may be in some respects an advantage, as relieving them from the temptation, which appears to beset some of those who have invested money in such apparatus, to indulge in what may be mildly called the most unconscionable bragging about it. We rather think that our professional readers can recall statements on the part of some of these practical men interested in tho manufacture of heating and ventilating apparatus, evincing a fertility of imagination which would do credit to a "writer" with an income much exceeding forty dollars a month; and one thinks with envy upon the salary which the possessor of such talents, together with experience in ventilating school-houses, must command "in the office or factory" to which he devotes his powers. It is not very long since we met one of these gentry, and heard him enlarge upon the merits of the furnace which he had "manufactured with his own money." Learning that the person to whom he was trying to sell the apparatus was a lover of fresh air, he was immediately struck by the happy coincidence between this requirement and the properties of the article which he had for sale. Not only, he explained, did his furnace yield pure air in great abundance, but the air proceeding from it was of a quality so singularly balmy and refreshing that a sod, cut from a meadow and placed in the heating chamber of the apparatus, would retain its verdure for weeks, and a leafy branch, in the same position, would continue green. These interesting representations were not immediately successful in securing his customer, and a few days afterward the practical manufacturer again made his appearance. Overhearing a conversation which was going on in regard to some kiln-dried flooring, he immediately interposed to call attention to another singularly appropriate quality of his marvellous furnace. For a house warmed with this, it appeared, there was no need of going to the expense of purchasing kiln-dried flooring-boards. All that was necessary was to buy and install the furnace and then pile the floor-boards in a room in which there was a register and light the fire, soon after which the boards would be found perfectly dried, equal, in fact, if not superior, to those prepared in the kiln. The trifling inconsistency between this and the former statement did not seem to be noticed by any one except an insignificant writer who was present, and the example illustrates what appears to us to be the sort of science commonly exhibited by "practical men" who have money invested in the manufacture of heating apparatus, as distinguished from that of mere theorists, who have not business talent enough to earn forty dollars a month by selling furnaces, and are obliged to content themselves with the prosaic facts disclosed by the anemometer, the wet-bulb thermometer and the carbonic-acid test. Indeed, the science of the practical man is, according to our experience, too profound to endure much trifling with the petty details which the poverty-stricken technical writers make so much fuss over. We recollect talking once with a man who sold a sort of ventilating apparatus, in which the outlet shaft was an inch pipe sixty or seventy feet long. We ventured in our humble way to inquire whether any movement of the air in this tube ever took place, but were silenced by the practical man's dignified reply that his business was to sell the apparatus, not to see whether there was any current in it. A good deal of the technical information placed at the disposal of architects is of a similar description, such that nothing but real theoretical knowledge will enable them to detect the fallacies contained in it; and in this, as in many other matters, it is a good plan to regard the assertions of persons who affect to despise books and those who write them with a certain degree of suspicion.

AMERICAN architecture seems to be becoming more and more fashionable abroad. The new firm of architectural book publishers in Paris, Messrs. André, Daly et Cie, have just published a book on "*Villas Americaines*," in which the work of the profession here seems to be fairly presented; and we find the illustrated supplement of the *Wiener Bauindustrie Zeitung* nearly filled with two double sheets of representations of American country houses, which, it must be acknowledged, are not flattered. The quality of the American work which pleases foreigners seems to be its picturesque and interesting irregularity. We are not sure that this feature of our buildings may not come in a great degree from our universal use of perspective sketches in designing, but whether our love of the picturesque comes from our perspectives, or our fondness for perspective from our love of the picturesque, we will not pretend to say. By way of contrast with the New World irregularity of design, the same number of the *Bauindustrie Zeitung* contains a sun-print of a pretty composition for the central portion of the new museum at Linz, decorated with a wide frieze of the beautiful sculpture in which the Germans now surpass all other people in the world. The design has for us a special interest as being the work of Bruno Schmits, of Düsseldorf, the selected designer of the Indianapolis Soldiers' Monument, and the author of one of the prize designs for the National Monument in Rome, as well as other admirable works.

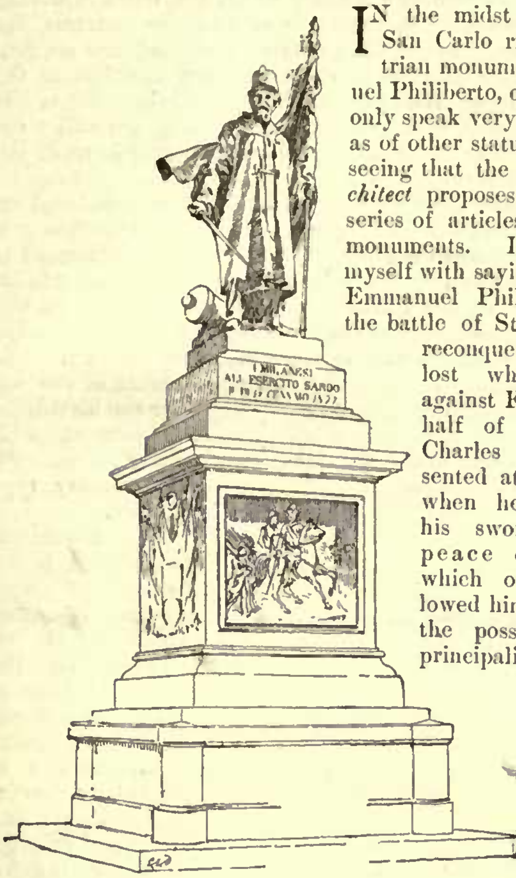
THE *Scientific American* gives an amusing description of the house of the new Electric Club in New York. The house is situated at No. 17 East Twenty-second Street, near Broadway, and is furnished with all sorts of electrical novelties. As a member approaches the front entrance he presses with his foot a certain piece of stone, the secret of which has been revealed to him on his initiation, and the door flies open before him. If he should find his boots muddy, he has only to step into the dressing room, where an electrical blacking brush, driven by an electric motor, is ready to polish them. An electric stove, in which heat is produced by the incandescence of a platinum wire, coiled over a large surface covered with asbestos, serves to warm dishes; and a safe with electric lock holds the valuables of members. For those who prefer strictly electrical diversions, long-distance telephones, storage-batteries, and other scientific apparatus are provided, while non-electrical billiard and pool tables serve to amuse persons of less intellectual tastes. We must say that we should have some suspicion of an Electrical Club pool-table. There was once an ingenious gambler who had a faro table made with levers, like the action of a piano, concealed under the green cloth. After a ball was thrown upon the table he could direct it, by means of the levers, into any place that he wished; and it would be strange if electrical attraction and repulsion could not be utilized to steer billiard balls in the desired direction over a table.

WE get some useful practical hints from the recent number of *La Semaine des Constructeurs.* With us gypsum is not so common a material in its natural state as to occasion much trouble, but it is found as a rock in the Provinces and in some other parts of the country, and is used very frequently in mixture with lime for interior plastering. When lime mortar is placed in contact with gypsum or plaster-of-Paris in presence of water, it has long been known that an injurious effect is produced on the mortar, but it is only recently that the effect has been satisfactorily explained. In 1885, it was discovered that the masonry of a portion of the fortifications of Paris, on the north-east side, was badly cracked, and investigation showed that the wall, which is in that place thirteen feet thick, was in several places entirely disintegrated. The masonry was of rubble of local stone, with a limestone facing. Every one knows that gypsum, or plaster-of-Paris, is very abundant in the neighborhood of that city, and lumps of it were found to be mixed with the limestone rubble, while the mortar in the rubble-work had in many places changed from a white to a pinkish color. The matter was put into the hands of an engineer officer, Captain Dolot, who first made careful observations of the masonry in place, and then proceeded to analyze the mortar to determine the reactions which had taken place. On removing the cut-stone facing, it was found that wherever the mortar came between two lumps of limestone, it was white and hard. If it came between a bit of limestone and one of gypsum, it was found to be softened, particularly where it came in contact with the gypsum, and where it occurred between two lumps of gypsum, it was invariably soft and powdery. When analyzed, the mortar between two gypsum stones was found to contain a considerable amount of sulphate of lime, while the water of hydration, which commonly forms about one-fourth of lime mortar, had nearly disappeared. This seems to indicate that the gypsum, or sulphate of lime, had slowly dissolved in the rain-water which fell upon the wall, and that the acid solution had acted upon the hydrate of lime in the mortar, dissolving it and carrying it into the pores in a condition to crystallize on the evaporation of the water. The crystallization and expansion of the new substance in the pores of the mortar disintegrated it by slow degrees, setting free the sand, so that in course of time the masonry became little more than a dry wall with some loose sand in the crevices. The red coloration of the crumbling mortar was attributed by Captain Dolot to the decomposition of the proto-silicate of iron, generally found in calcined lime, by the sulphate of lime, which by double decomposition, attacked the iron salt to form silicate of lime and sulphate of iron, which was again decomposed by the excess of hydrate of lime present to form sulphate of lime and peroxide of iron.

ANOTHER practical suggestion relates to the painting of floors. It seems that any color containing white lead is injurious to wood floors, rendering them softer and more liable to be worn away. Paints containing mineral colors only, without white lead, such as yellow ochre, sienna or Venetian or Indian red, have no such tendency to act upon the floor, and may be used with safety. This quite agrees with the practice common in this country of painting kitchen floors with yellow ochre or raw umber or sienna. Although these colors have little body compared with a white-lead paint and need several coats, they form an excellent and very durable covering for the floor. Where a floor is to be varnished, it is found that varnish made by drying lead salts is nearly as injurious as lead paint. Instead of this, the borate of manganese should be used to dispose the varnish to dry, and a recipe for a good floor varnish is given. According to this, two pounds of pure white borate of manganese, pounded very fine, are to be added, little by little, to a saucepan containing ten pounds of linseed oil, which is to be well stirred, and gradually raised to a temperature of three hundred and sixty degrees Fahrenheit. Meanwhile, heat one hundred pounds of linseed oil in a boiler until bubbles form; then add to it slowly the first liquid, increase the fire, and allow the whole to cook for twenty minutes, and finally remove from the fire, and filter while warm through cotton cloth. The varnish is then ready and may be used immediately. Two coats should be used and a more brilliant surface may be obtained by a final coat of shellac.

THE editor of the *Wiener Bauindustrie Zeitung* has been investigating a new heating apparatus, and speaks of the conclusions to which his inquiries have led him with a refreshing frankness which might be imitated in other technical journals under similar circumstances with advantage to their readers. The device in question is a stove, which does not burn gas, yet needs neither smoke-pipe nor chimney; its fuel consisting of a secret composition which develops heat by chemical reaction without smoke. The editor of the excellent little Vienna journal, wishing to be able to speak intelligibly of a much advertised article, procured one of the stoves and tried it. The name of the stove, the "Carbonnatronofeu," gives a hint of the character of the fuel, but its composition is not made known to the public, and it must be bought of the inventor. The apparatus for using it consists of a tin cylinder with a smaller cylinder attached to it. The mysterious fuel is put in, and, we suppose, lighted, and the cylinder thereupon gives out what the notice calls a "dismal and unpleasant heat," while, although there is no smoke, an "intolerable and choking vapor" collects in the cylinder, and is discharged downward through the small tube near the floor of the room, into which it immediately begins to diffuse itself. On the whole, the editor's opinion is that the apparatus possesses three defects: the disagreeable quality of the heat produced by it, the dreadful stench which comes from it, and the quantity of air consumed by it which might otherwise be used for breathing; and one good quality,—its portability, which enables persons who cannot endure it any longer to pick it up easily and carry it out of the room.

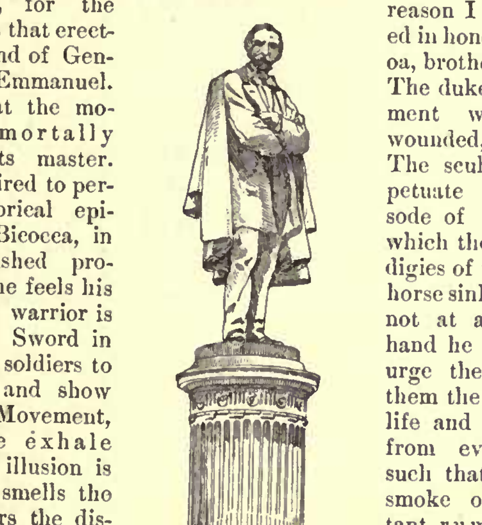
ITALIAN CITIES — TURIN.[1] — II.



Sardinian Standard-Bearer. — V. Vela, Sculptor.

IN the midst of the Piazza San Carlo rises the equestrian monument of Emmanuel Philiberto, of which I shall only speak very briefly, as well as of other statues of this kind, seeing that the *American Architect* proposes to publish a series of articles on equestrian monuments. I will content myself with saying that Prince Emmanuel Philiberto, who at the battle of St. Quentin had reconquered his duchy, lost while fighting against Francis I in behalf of the Emperor Charles V, is represented at the moment when he is sheathing his sword after the peace of Cambresis, which once more allowed him to enter into the possession of his principality. One of the bas-reliefs which the pedestal bears has for its subject the signing of the treaty of Cambresis. The other represents the battle of St. Quentin, which definitely set the seal of warlike prowess upon the hero. This monument was executed in 1838 by the sculptor Marrochetti, under the order of Charles Albert, and it is certainly one of the most agreeable specimens of modern statuary.

Another equestrian monument, of which I can make but bare mention, for the reason I have just stated, is that erected in honor of Duke Ferdinand of Genoa, brother of King Victor Emmanuel. The duke is represented at the moment when his horse, mortally wounded, falls beneath its master. The sculptor, Balzico, desired to perpetuate in bronze an historical episode of the battle of La Bicocca, in which the hero had accomplished prodigies of valor. Although he feels his horse sinking under him, the warrior is not at all disconcerted. Sword in hand he turns towards his soldiers to urge them to the combat, and show them the path from danger. Movement, life and the ardor of battle exhale from every part, and the illusion is such that one fancies he smells the smoke of powder and hears the distant rumbling of cannon. Of the equestrian statue of Charles Albert, which stands before the Palazzo Carignano, I will say nothing, for my readers have already seen a sketch of it in the *American Architect* for October 1, 1887.



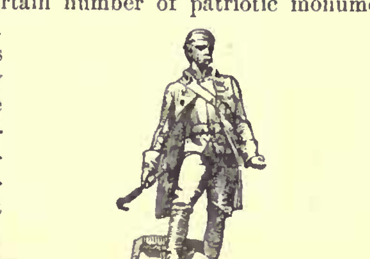
Massimo d' Azeglio. — A. Balzico, Sculptor.

The group which the citizens have erected in honor of the Green Count (il Comte Verde) before the municipal palace does not lack a certain value. Amadeus VI of Savoy, surnamed the Green Count, owed this nickname to his peculiar

Monument to the "Green Count." Turin.

habit of wearing arms and emblems of this color at tourneys and in the lists; the plumes on his casque and all the accessories of his armor were always green. In 1366 he travelled to the East to defend the emperors of Constantinople against the Turks. He returned burdened with glory and honor, and may be considered as the first and principal founder of the power of the Dynasty of Savoy, which was at the beginning one of the most catholic in Europe. He died of the plague. In the group which has been dedicated to him, we see him at the moment when he is about to deliver a blow upon a Turk whom he has just overthrown. The pose of the two combatants is perhaps a little too academic, but it is not altogether lacking in naturalness and elegance.

Besides these, which have an especial historic value, Turin possesses a certain number of patriotic monuments, which are distinguished by their air of modernness and relate to contemporary events, or at most date back to that burst of nationalism which enfevered the Piedmontese people about 1848. It must not be forgotten that Turin was the hotbed of the political movement which resulted in Italian unity. While the whole peninsula was in ebullition, the capital of the princes of Savoy was the rendezvous for *emigrés* and conspirators from other Italian States, which were destined to disappear in the revolutionary turmoil. It is here, then, that we ought to find in the greatest number those public witnesses to the rôle which Piedmont played in the national drama, and it is particularly the monuments which afford us this testimony. The statue of Pietro Micca, although



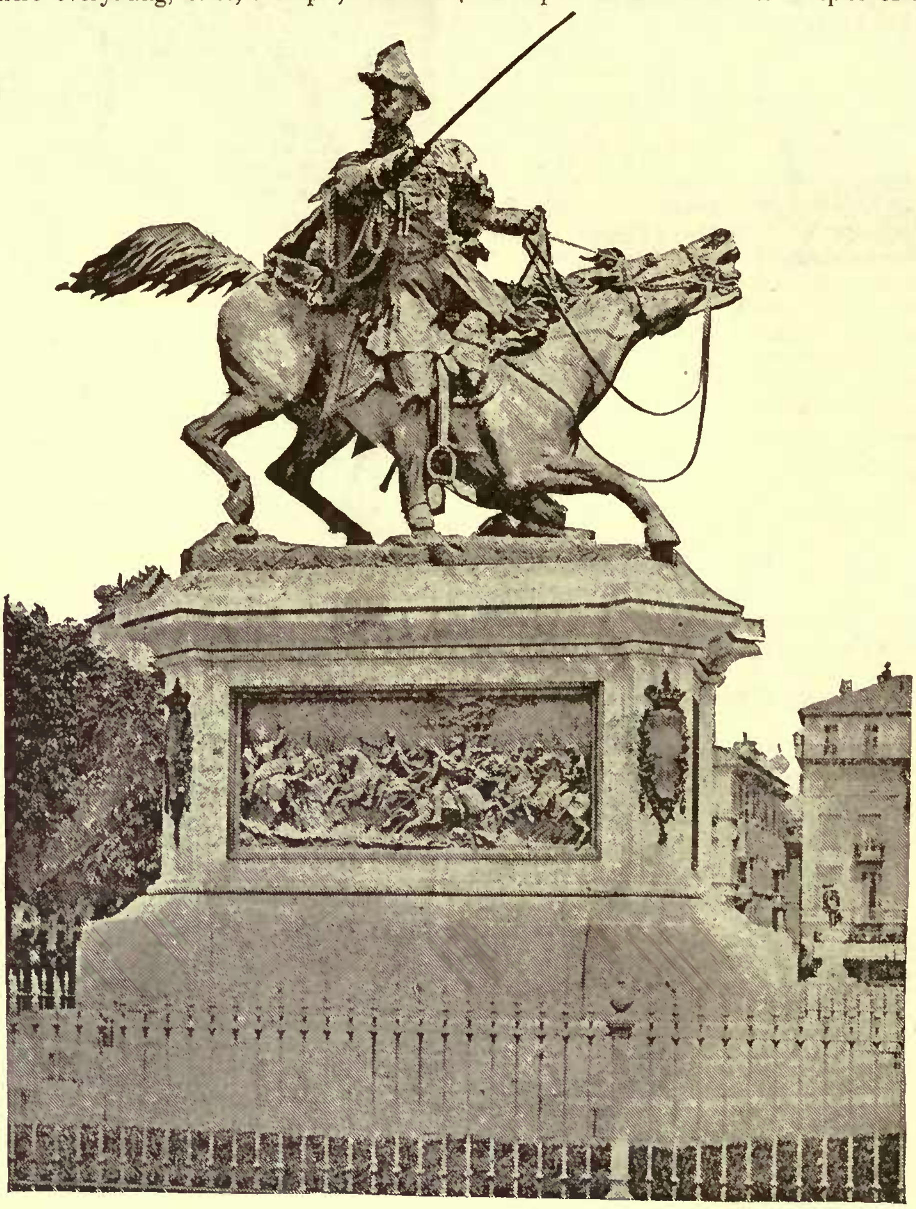
Pietro Micce. — Cassano, Sculptor.

[1] Continued from page 113, No. 637.

relating to an event which dates from the commencement of the last century, really belongs to this series. Pietro Micca is one of the most impressive incarnations of patriotic devotion: he belonged to the army of Savoy at the time when the French army laid siege to the city of Turin; the position was desperate, and on the night of August 30, the fortress was to be abandoned. Then Micca offered himself a sacrifice for the liberty of his country. He persuaded his comrades to withdraw, and he remained alone beside the mine, a lighted match in his hand. The enemy, perceiving the fort abandoned, entered without distrust, and when the foreign troops were within the walls the heroic Piedmontese miner lighted the train and was blown up with them. Such an act of courage is very rare in history, and finds but few parallels in antiquity; for a difference must be made between the bravery which shows itself on the field of battle, where everything, noise, example, dash and the spirit of imitation combine to excite the soldier, and the deliberate sacrifice of the hero, who, in absolute loneliness, having for support only his resolution and indomitable heroism immolates himself. It is natural that a people who, like the Piedmontese, have founded its grandeur on the practice of military virtues should have felt, as soon as a breath of liberty had come to animate them, that they ought to glorify the man who, in himself, personified these virtues in so high a degree. The monument to Pietro Micca was erected in 1864, directly after the proclamation of the Kingdom of Italy. We see him standing upon his pedestal, his left hand clenched in anger, while in his right hand he holds the lighted match with which he is to deal himself death in order to deliver his native country. The expression of his countenance satisfies the ideal which those who have studied Piedmontese history profoundly have formed for themselves. Micca has the severe and serious countenance of a soldier who has faced death before yet marches confidently to martyrdom.

I should like to speak in praise of the statue of Count Cavour, who passes as the principal fashioner of Italian unity; but my optimism fails me in the presence of this work, although it comes from the hands of the celebrated Dupré, the leading sculptor of modern Italy, to whom we owe the magnificent bas-reliefs of Santa Croce at Florence. Surely we perceive easily the elegance of certain touches, the masterly ability of one of the most skilled handlers of the chisel whom our time has known, yet the general grouping of the figures shocks every sentiment. To bring into relief the depth of the gratitude which the nation entertains for this celebrated statesman the author had the bad taste to place Italy on her knees before him. This, in itself, is enough to give to the composition an air of servility and baseness which degrades it. Such a want of dignity in an artist is only possible in a country which has not had a long political education. On the other side of the Atlantic, for example, it hardly would have entered the mind of a sculptor that it would be possible to show America prostrate at the feet of Lincoln or Washington; yet, nevertheless, the merits of these two great men towards their country are still more incontestable than those which M. Cavour can have in the eyes of his countrymen.

In the midst of the Piazza Castello rises upon a pedestal enriched with bas-reliefs in bronze the statue of a color-bearer clothed in the Italian uniform. This statue was presented to the citizens of Turin by the Milanese as a sign of gratitude for the support which the Piedmontese lent Lombardy in its war with Austria, and as a gauge of those hopes which still lived in the depths of Italian hearts in spite of recent reverses. The bearing of the soldier and his martial air present with sufficient accuracy the military type of Italy.



The Duke of Genoa. Turin. A. Balzico, Sculptor.

The monument consecrated to the memory of Massimo d'Azeglio, which we see on arriving on the square in front of the station, is calculated to inspire sentiments of another order. D'Azeglio was one of those fine natures common enough in the south of Europe, whose rich and fecund temperament lent itself to all kinds of pursuits. He was musician, painter, romancer, and in spite of the variety of these accomplishments, he found time and courage to discharge the duties of public minister. Political life inspired in him a profound disgust for men and things, and we read on the bronze tablets which ornament this monument a passage from his memoirs, where appear the discouragement and fear with which this precociously torpid Italy with its so different and so fragile elements inspired him: "I will remind the people of Italy that the independence of a race is a consequence of independence of character. He who is the slave of municipal passions or sects, ought not to complain of being a slave to foreigners."

The statue of Azeglio has for a pedestal the drum of a fluted column resting on a marble die. The sculptor has very happily overcome the almost insuperable difficulty which a statue in modern garb almost always presents — one of those fatalities out of which art must work its own salvation. Trousers and frockcoat are the negation of all the proprieties of sculpture, and the great men who have been born since the vest was invented must resign themselves to be undressed and clad like Romans after their death, or to appear in the eyes of posterity in a guise wholly devoid of dignity. Absolute absurdity can be avoided by draping the figure in vast cloaks

or by enlarging the folds of the overcoat in such a fashion as to conceal the poverty of the general lines; but even then the classic beauty of the nude or the draped figure, as it is found in ancient statues, cannot be equalled in this way. To be a Phidias is quite impossible in a world where coat and petticoat are held in honor; and one finds great difficulty in picturing to himself Athena Parthenos dressed in a farthingale, or Olympian Zeus topped out with a pot hat.

In the centre of the Piazza dello Statuto, at the back of the Via di Dora Grossa, is the largest monument in the city, erected from the design of Count Panissera di Veglio, one of the most distinguished members of the Piedmontese aristocracy, the purpose of which is to commemorate the triumph achieved by Science in the tunnelling of Mt. Cenis. Count Di Veglio was certainly a very respectable aristocrat; but the work to which his name is attached proves that one may have all the merits which belong to birth, and yet not possess the qualities which an artist should have. Mt. Cenis Tunnel does honor to modern science. By piercing the Alps the engineers Grandis, Grattoni and Sommelier, who in different degrees contributed to the realizing of this gigantic enterprise, acquired a right to be reverenced by posterity; but the means which have been chosen for perpetuating and glorifying the remembrance of their success does not seem to me to be very appropriate. There has been piled up in the form of a pyramid a mass of Cyclopean blocks, and on this Liliputian mountain have been

Monument to commemorate the Piercing of the Mt. Cenis Tunnel.

scattered a legion of Titans, endeavoring to scale the rough granite and reach the summit. A winged genius hovering over the summit terminates this abrupt heap. Some of the Titans are fairly well treated by the sculptor Tabacchi: one with arms caught between two rocks, is already breathing his last; another in vain tries to support a block of stone which is crushing him; still another clings with difficulty to the rough surface of the stone; and another overcome and exhausted falls on his side and closes his eyes and awaits death. It is a very drama, such as mythological legend pictures for us; but what have Titans to do with a representation whose object is the celebration of one of the great victories of progress? The sons of Uranus were conquered in a criminal contention, in a culpable revolt which they had undertaken against their father, while Science has come triumphant from a legitimate combat which she entered into against Nature. There is no connection between the two themes; or, if there is any, it is only a connection of opposition and contradiction. Signor Panissera di Veglio would have done better to leave the sons of Gæa quietly asleep, and had recourse to another allegorical subject to furnish the apotheosis of the engineers who pierced the Alps.

Turin contains several fine palaces. The ancient royal palace is the most monumental of all. It was commenced by Prince Emmanuel Philiberto, and subsequently enlarged by King Charles Emmanuel I. his son. In 1646, the regent Maria Christina had it entirely rebuilt after the designs of the architect Castelmonte, and other princes of Savoy have completed the interior decoration and finished by making it a truly royal dwelling. The present façade is not remarkable, for it is entirely executed in the style of the seventeenth century, which lacked elegance and originality. Italian architecture at that time, corrupted by the *baroque* elements which exaggerated and depraved everything, had fallen into a condition of most lamentable poverty. We notice, nevertheless, upon two pedestals which flank the gate at the entrance the equestrian figures of Castor and Pollux, whose pose and the rhythm of whose figures recall specimens of the Greek school. At the foot of the staircase of honor, the visitor can behold another equestrian monument of Emmanuel Philiberto, executed in 1620 by the Roman sculptor Rivalta. A curious monument it is — one of those rare figures where marble and bronze are combined; the horse is of marble, while the statue of the prince is of metal.

One of those precious objects of art which the palace encloses I ought to mention — a gilded wooden door ornamented with very fine carving, executed in 1662 by Anthony Both. A great picture by Micle, which represents Peace, is in the ceiling of the throne chamber. In the way of curiosity, we are shown also a hall called the Scissors Hall, where the architect Juvara, in a panel of the decoration, caused to be moulded a pair of scissors in allusion, the story goes, to the ill offices of which he was the object on the part of his rivals; for in Italy, when any one is spoken ill of behind his back, the proverb says that they are cutting his clothes to measure.

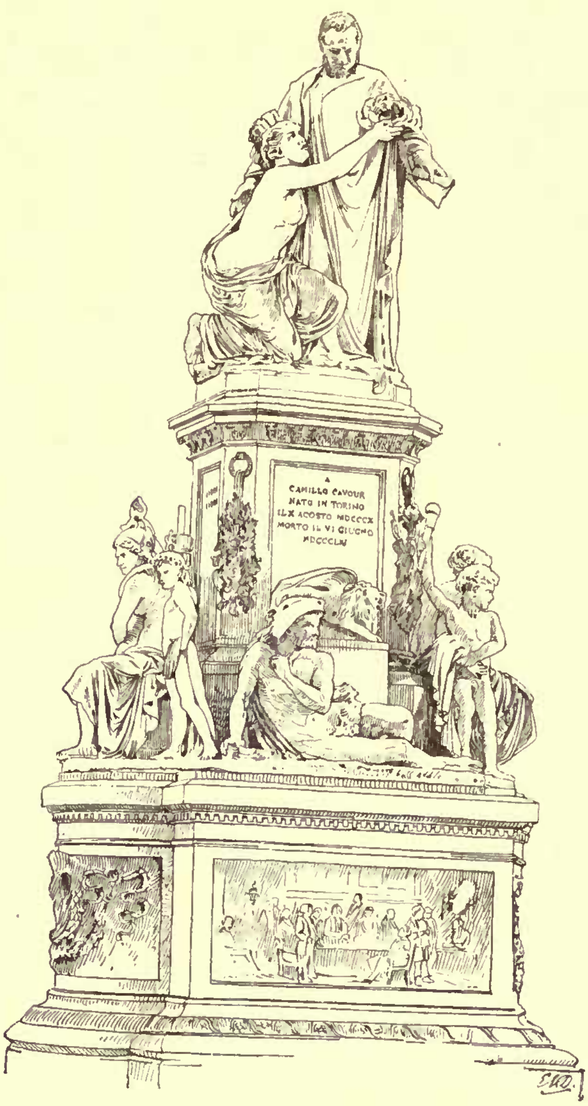
One of the most curious things about this royal dwelling is the floor of the throne chamber, which is composed of a rare wood, so arranged as to form beautiful mosaic designs. This floor barely escaped entire destruction at the time of the sojourn of the Shah of Persia in Europe. King Victor Emmanuel offered the hospitality of his palace to the sire of Teheran, whose cooks, in their endeavor to remain faithful to the culinary ritual of their nation, prepared a great heap of embers in the very middle of this floor, where at they cooked pork, lambs and legs of mutton on the spit. After his departure the King had to spend a considerable sum in repairing the damage done by his Mussulman guest.

After the royal palace, the Palazzo Madama must be visited, situated a short distance away on the Piazza Castello, which owes its name to the long sojourn which the Duchess Jeanne de Nemours made there. This palace is lacking in style, and is built without symmetry. It is said that it rests on the remains of an ancient Roman building; and in fact the material of its foundation has quite that character of robust old age which we find in all the ruins of antiquity. At any rate, it is one of the oldest palaces in Turin, and formerly served as the governmental residence. The two colossal towers which crown it were erected between 1410 and 1416 by Prince Ludovic d'Acaja, and the Princes of Savoy dwelt there until Emmanuel Philiberto built the new palace which we have just visited. This building still preserves the savage and sombre air of the centuries which gave it birth, and seems much more a military castle than a home of aristocrats. The two towers contain in the lower stories dark cells, very narrow and fitted with iron rings and chains, where the State prisoners were submitted to stern captivity. In one of these cells was discovered a complete collection of instruments of torture. About the year 1700, the Duchess de Nemours, niece of King Charles Emmanul II, came to dwell here. She led a life of dissipation, and her dissolute manners soon earned for her the contempt and hatred of the people. For the convenience of her intrigues, and in order to be able in case of need to escape the fury of the people, or the attacks of her enemies, she caused to be built two subterranean corridors, which put her dwelling into communication with the royal palace and the Valentino. From the year 1848, when the parliamentary constitution of Piedmont was declared, up to 1864, when the transferrence of the capital of the kingdom of Italy to Florence was decreed, the Palazzo Madama was the seat of the Italian Senate, which, by a strange coincidence, occupies to-day at Rome a palace by the same name.

The Palazzo Carignano, where the Chamber of Deputies used to hold its sittings before the capital was moved to Florence, is only a one-story building, but the richness of its interior decoration places it above all other buildings of this kind which

Turin possesses. The wall and windows of the first story are brought forward and supported over a round-arched portico, whose fluted pilasters and capitals are repeated up to the terrace which covers the building. This terrace is enclosed by a balustrade which is broken at points corresponding with the pilasters by pedestals supporting architectural emblems. The three porticos in the middle, forming the central feature of the design, are flanked by two pairs of fluted columns, which are detached from the whole, and are repeated in the upper part by the same arrangement, so as to support four pedestals, on which are statues. The central portion of the building rises another story and we see here renewed on a smaller scale the theme which rules in the other portions. At each end of this central body the architect has arranged pavilions with niches which contain statues. In spite of this excessive crowd of ornamentation and features, the general appearance of this architectural morsel is quite agreeable.

The Castello Valentino is a vast building which was erected on the left bank of the Po at the end of a magnificent alley



Monument to Cavour. Dupre, Sculptor.

of lime trees. It is surrounded by verdure, and its imposing mass detaches itself vigorously from the midst of the picturesque country landscape. Its origin is shrouded in obscurity, and no one knows even the reason of its name, which historians interpret in very different fashion. What in any case is beyond dispute is that its structure declares it to be certainly anterior to the second half of the sixteenth century. The façade which overlooks the river is remarkable for a sobriety which is not preserved in buildings of a later date, although the relative heaviness of the whole makes us feel that the decadence is already approaching. To remedy this heaviness they crowned the corners of the principal body with four towers covered by gable roofs, and at the centre of the façade constructed a projecting terrace, to which two ramped staircases lead. This somewhat breaks up the monotony of the design, which without it would rule in the aligment of the windows. To-day there is at the Valentino a training-school for engineers.

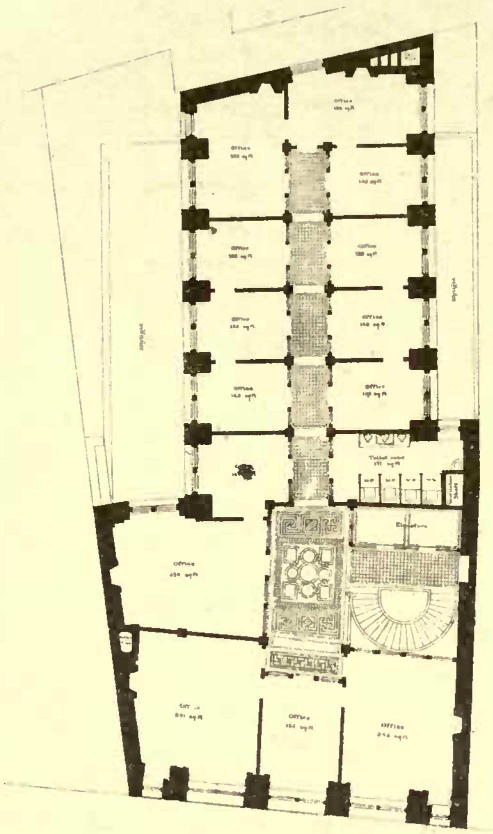
On the same bank of the Po, the organizing committee of the International Exhibition of 1884 had the ingenious idea of constructing a château complete in the style of the Middle Ages, and they fixed on the model of the fifteenth century, when the severe and robust architecture which characterizes this class of building was in its full flower. The architects intrusted with the execution of this idea devoted themselves to a very conscientious study and travelled into the most remote districts of Piedmont, where still remain ruins of this age which are sufficiently well preserved for study. Owing to these researches they were able to conceive and carry into execution a work which gives us a sensation of a perfect resurrection of the various details of which their aim was to recall to us the recollection. The moat, the drawbridge, the postern, the towers, the court of honor, the *salle d'armes*, all serve to transport us in imagination to that age of iron, when life was a perpetual combat, and when, under the guise of an arrogant chivalry feudal aristocracy exercised its trade of rapine and pillage. The houses grouped about the castle also had a varied physiognomy, and during the exhibition inhabitants, clothed in Middle Age costumes, observed the customs and engaged in the works of the epoch to which they pretended to belong. At the left in the court-yard the *salle d' armes* was peopled with soldiers armed with rapiers, and wearing large felt hats, warming themselves about a spacious and seigniorial fireplace. Then came the kitchens, the dining-hall, the sculleries, the cellars, the *oubliettes* — all the accessories, in a word, of a feudal military household. It was picturesque and attractive.

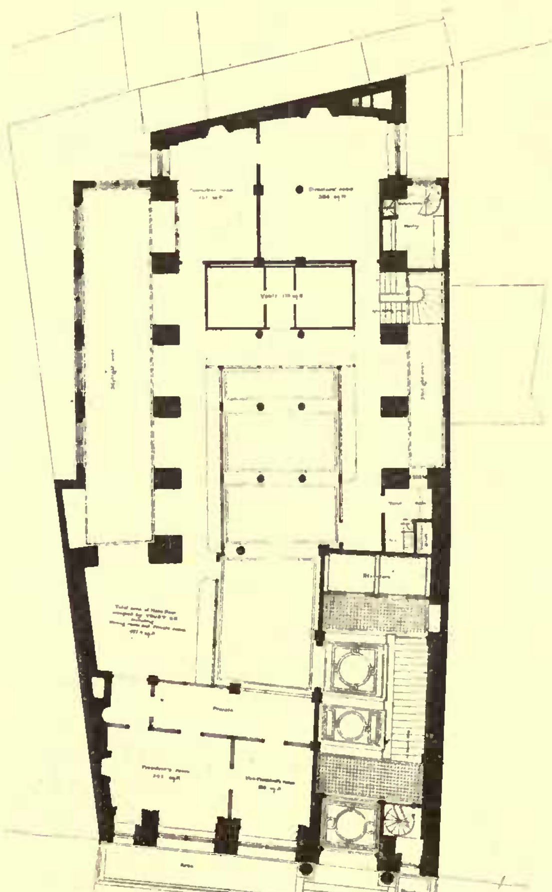
I should like to speak also of the gallery of arms established by King Charles Albert in the Salle de Beaumont, but I should step outside of the purely architectural frame within which I must confine my travelling notes, and, besides, space is wanting. I will content myself with saying that in this gallery one can see an incomparable collection of arms and armor — cuirasses, helmets, swords, poniards, halberds, fusils, musketoons, arbalists, cross-bows, lances — all the murderous paraphernalia of the heroic ages are here represented under multiplied and varied forms. In certain rooms we perceive whole rows of warriors on horseback, armed from head to foot, and the effect is so striking that in the dusk they seem about to charge one upon another. Midst these historic treasures there exists some which have a great artistic value, and we see at the side of the armor of Emmanuel Philiberto the shield of Charles Emmanuel I in burnished steel, a rich buckler wholly sculptured by hand of Benvenuto Cellini.

Although the Basilica of Superga is some little distance from Turin on the hill which bears its name, we may say that it forms a portion of the monumental patrimony of this city. It is here that repose the ashes of all the princes of Savoy. One can see at the side the tombs of Victor Amadeus II, who was the first king of Sardinia, and of Charles Emmanuel III, his son, those of Victor Emmanuel I, Charles Albert, and Marie Adelaide of Austria, wife of Victor Emmanuel II. There are only lacking the remains of Charles Felix, whose mortal ashes rest in the Church de la Haute Combe, in Savoy; and those of Victor Emmanuel II, which rest in the Pantheon at Rome.

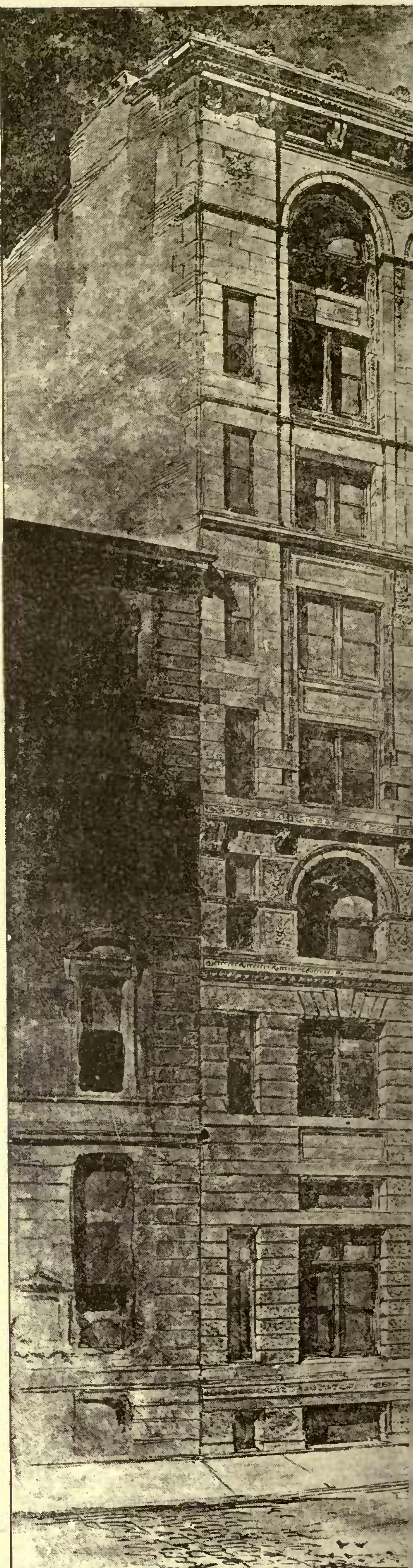
The erection of the Basilica of Superga was begun in 1715, in fulfilment of a vow of King Victor Amadeus II while his capital was besieged by the French troops in 1706. It is conceived in a composite style analogous to that of the Roman churches of the same age; but in spite of want of purity in the structure, it produces a positive impression because of the advantageous position in which it is placed, and the light which bathes it incessantly. Its lofty dome and bell-tower are not without elegance, and if we mount to the platform which surrounds the lantern of the dome we can enjoy one of the most beautiful panoramas in the world. The gaze embraces the entire range of the Alps, and with a field-glass the spires of the cathedral at Milan can be seen. Everywhere the eye perceives the smiling fertile fields of Italy, and one cannot avoid a lively feeling of emotion in thinking that there lie before one the plains of Lombardy and valley of the Po, where during so many centuries the armies of the old world gave one another rendezvous to decide their quarrels. The thought becomes grave and mournful, and one is seized with a sensation of grief at the rising thought that if all the dead who have watered this smiling land with their hearts' blood should arise, the immense and flowering fields would be peopled with phantoms.

H. Mereu.

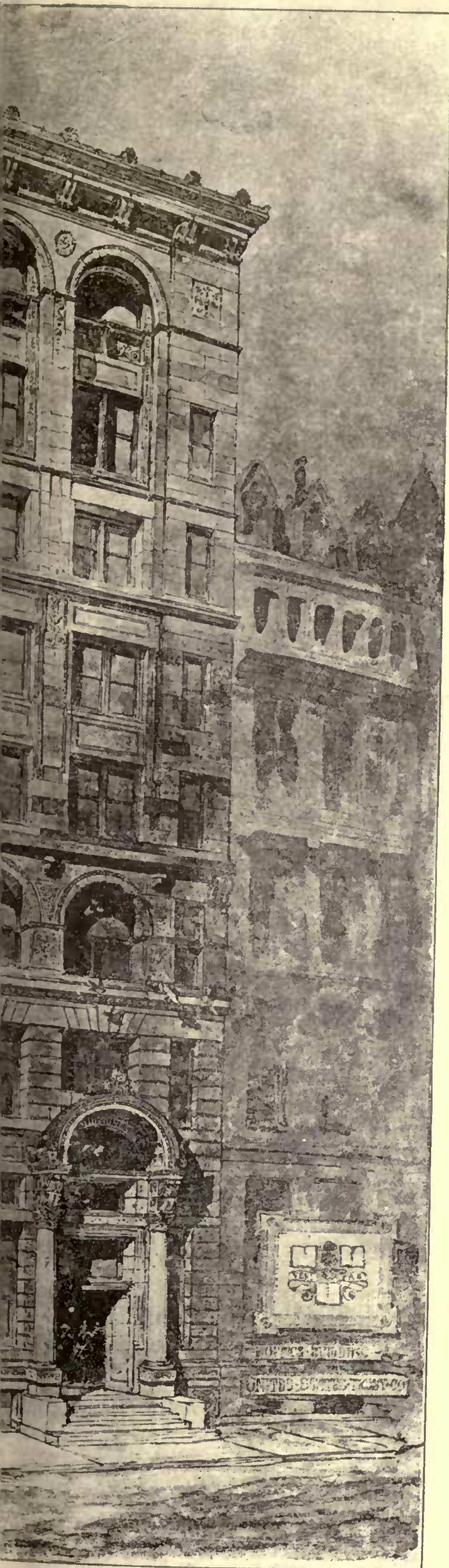


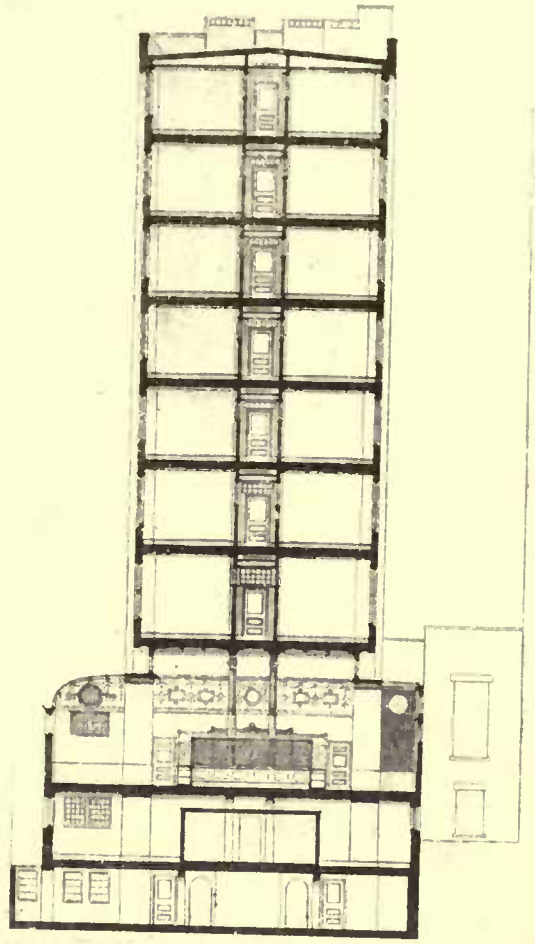


Competitive Drawings
for the
OFFICE BUILDING
for the
UNITED STATES TRUST Co
First Storey Plan
Submitted by Babb Cook & Willard 55 Broadway N.Y.

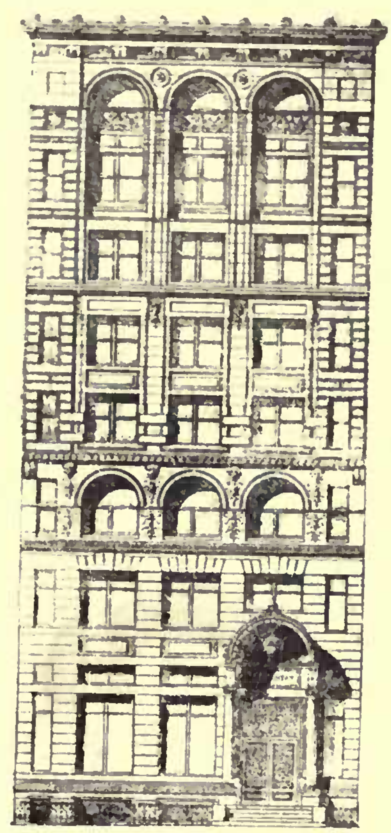


TRENCH & Co





COMPETITIVE DRAWINGS SUBMITTED BY BABB COOK & WILLARD 55 BROADWAY N.Y.



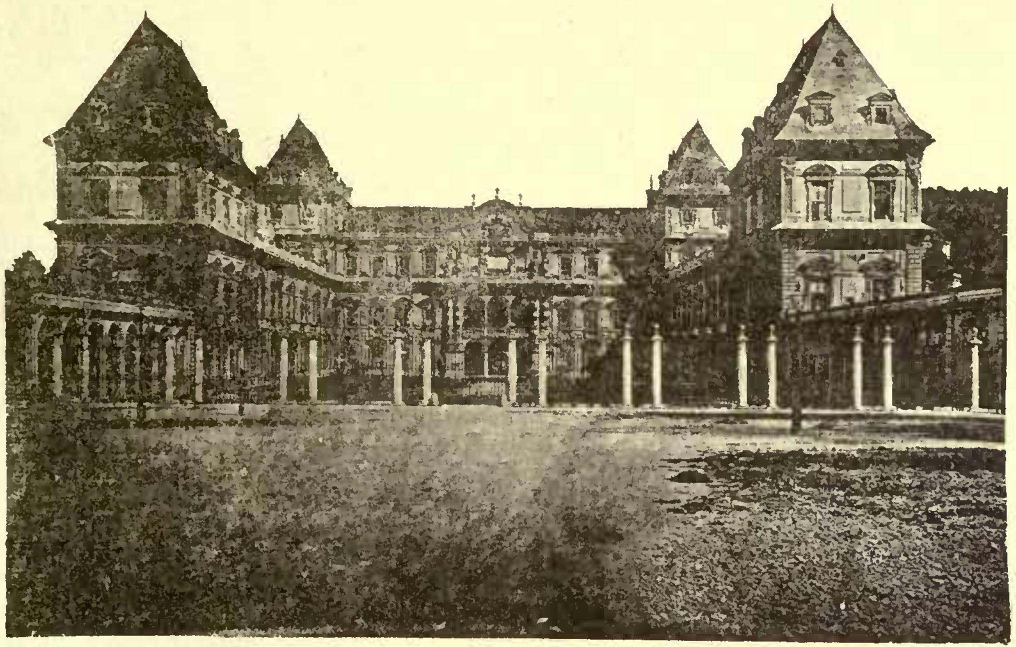
..liotype Printing Co Boston

COPYRIGHT 1888 BY TICKNOR & Co

BLOCK OF STORES FOR MESSRS. { M. ROSENHEIM. A. FRANKENTHAL. W. GOLDSTEIN. N.E. COR. 9TH & WASHINGTON AVE. ST. LOUIS, MO. A. F. Rosenheim, Arch't. St. Louis. 417 Olive St.

Heliotype Printing Co. Boston.

Mediaeval Castle at the Exhibition of 1884:



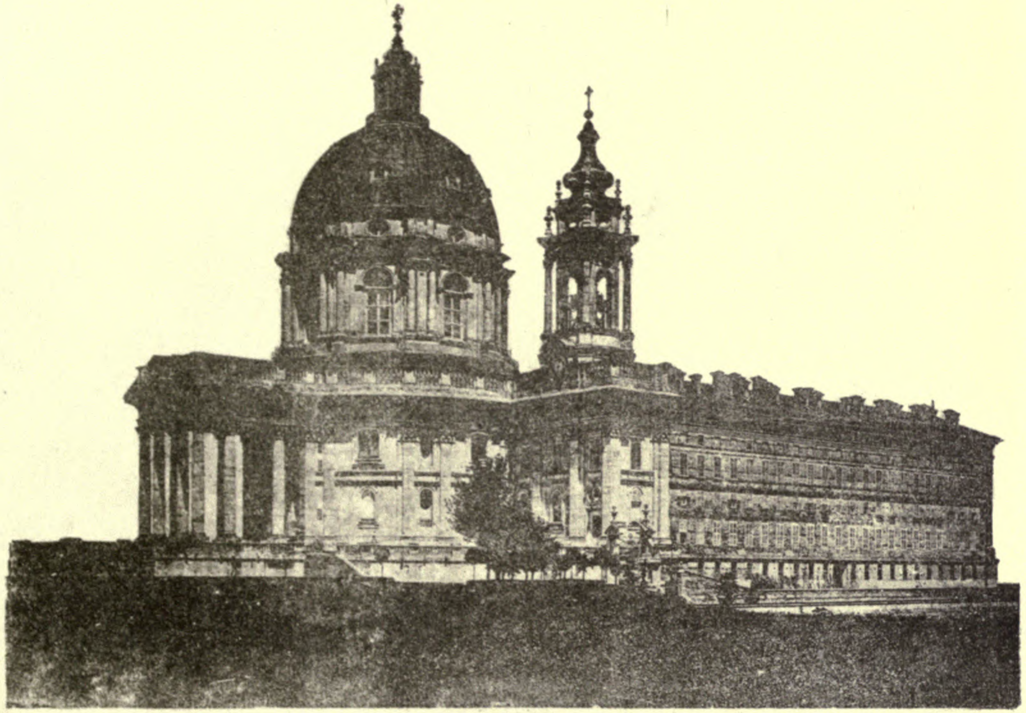
The Valentino,~ built 1653

The Royal Palace ~ built about 1660:

Heliotype Printing Co. Boston.

: TURIN :

COPYRIGHT 1888 BY TICKNOR & Co

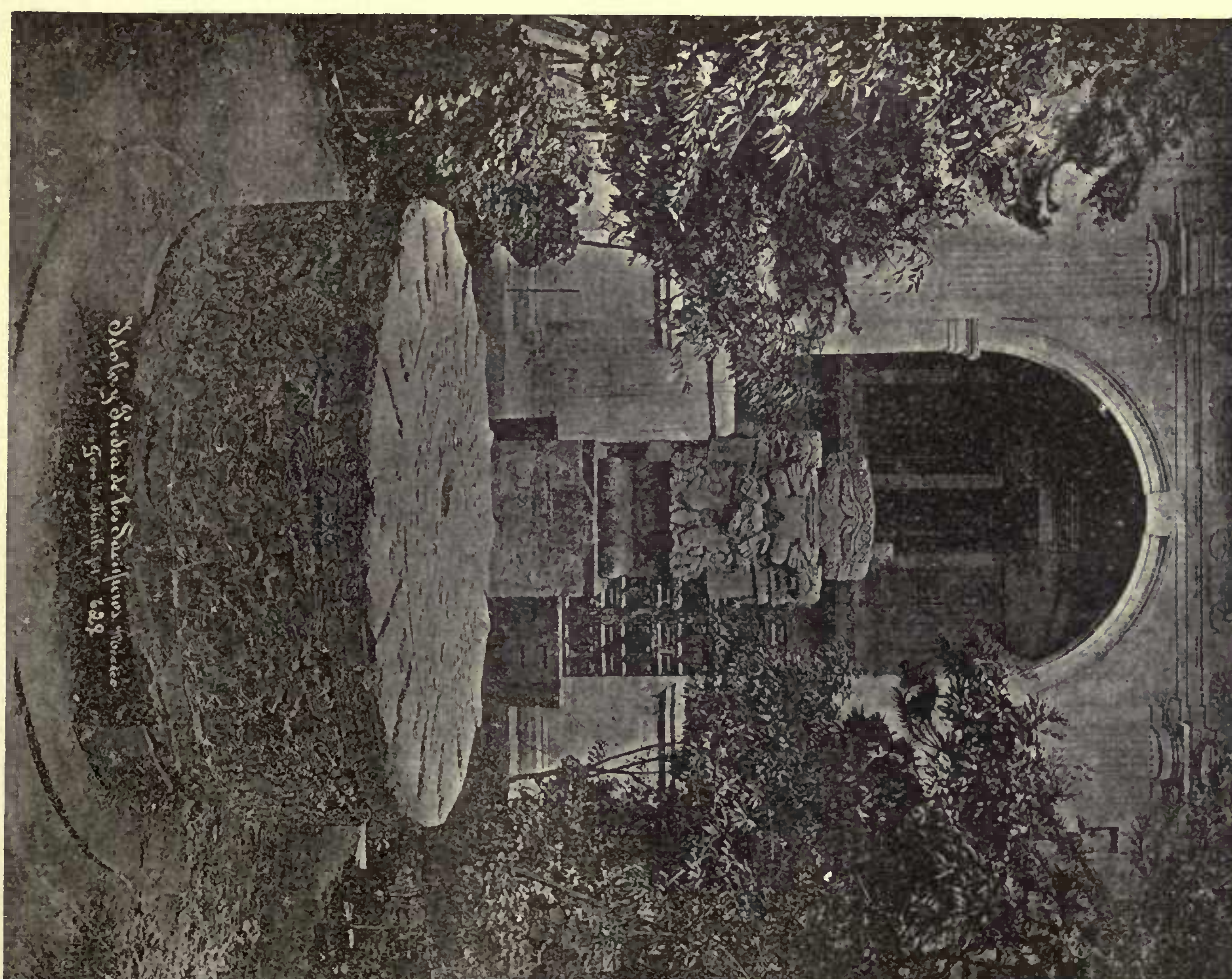


The Superga ~ Royal Burying Place:
Juvara, Architect:

La gran Madre di Dio: ~
~ Bonsignore, Architect

COPYRIGHT 1888 BY TICKNOR & Co

Aztec Calendar Stone



Aztec Sacrificial Stone.

Heliotype Printing Co. Boston.

THE ILLUSTRATIONS

[*Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.*]

THE CATHEDRAL OF NOTRE DAME, OTTAWA, CANADA.

[Gelatine print, issued only with the Imperial Edition.]

COMPETITIVE DESIGN FOR OFFICE BUILDING OF THE UNITED STATES TRUST BUILDING, WALL ST., NEW YORK, N. Y. MESSRS. BABB, COOK & WILLARD, ARCHITECTS, NEW YORK, N. Y.

IN this limited competition which took place in January last none of the designs submitted proved acceptable.

THE AZTEC CALENDAR STONE AND THE SACRIFICIAL STONE, MEXICO, MEXICO.

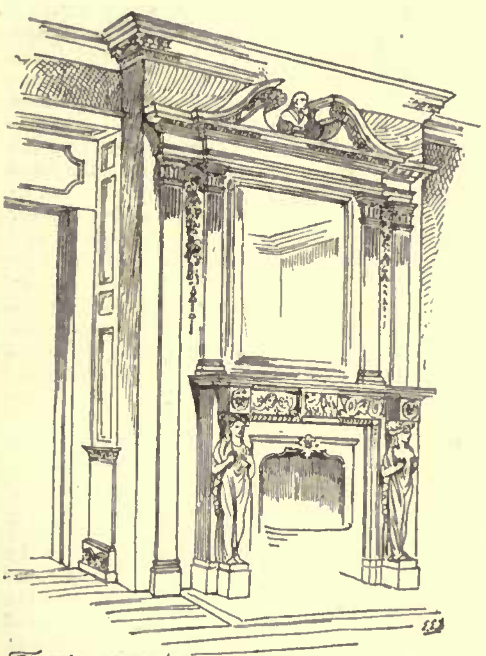
For description see article elsewhere in this issue.

VIEWS IN TURIN: — THE VALENTINO; THE SUPERGA; THE MEDIÆVAL CHATEAU; THE CHURCH OF GRAN MADRE DI DIO; THE ROYAL PALACE.

For description see article elsewhere in this issue.

WAREHOUSE FOR MESSRS. ROSENHEIM, FRANKENTHAL & GOLDSTEIN, ST. LOUIS, MO. MR. A. F. ROSENHEIM, ARCHITECT, ST. LOUIS, MO.

THE AZTEC CALENDAR AND THE SACRIFICIAL STONE.



Marble Mantel: Van Rensselaer Mansion, Albany, N.Y. date 1765.

TWO huge monoliths exhibited in the National Museum in the city of Mexico are worthy of notice in the pages of the *American Architect*. They are the so-called "Aztec Calendar Stone" and the stone upon which were offered the human sacrifices to the Sun. It would perhaps never have occurred to me that there was any architectural interest attaching to these two specimens of Aztec sculpture had not an architect once shown a deep interest in them and expressed great satisfaction upon securing photographs of them.

The two stones were discovered in excavating in close proximity to the great cathedral in the years 1790 and 1791. Upon the destruction of the city by the Spanish conquerors, these stones, with the other appurtenances of heathen worship, were buried out of sight of the heathen to prevent the recently converted from lapsing into their former religion. Upon the discovery of the Calendar Stone, the Commissioners of the Cathedral begged for it, and the Viceroy gave verbal orders to deliver it to them on condition that it was to be preserved and publicly displayed. It was accordingly built into the base of the southwestern tower of the Cathedral,[1] and there it remained until the summer of 1885, when it was removed to the room in the National Museum, especially prepared for the larger and heavier relics of the Aztec idolatry.

The calendar stone is twelve feet in diameter and weighs, by estimation, over twenty-four tons. It was quarried and carved at Tenantitlan, in the mountains beyond Lake Chalco, and was transported to the capital, a distance of several leagues, by means of rollers and ropes. The Aztecs had no draught animals and it required the combined efforts of ten thousand slaves to drag this great burden from the quarries to the island city of Tenochtitlan and place it upon the Temple of Huitzilopochtli, and in accomplishing this task the immense stone broke through one of the bridges to be crossed, drowning several of the priests who accompanied it, and putting those superintending the transportation to an immense amount of trouble in raising it from the bottom of the lake into which it sank. All this is upon the authority of a very early historian. The year 1512 is assigned as that in which the task of bringing this immense sculptured block to the capital was accomplished — only a few years before the Conquest.

An elaborate key to the figures sculptured upon the calendar stone would be of interest only to the archæologist, who would probably be dissatisfied with those given and seek one more satisfactory elsewhere; for the meaning of the calendar stone is still a subject for discussion among the learned. It has been claimed by some that the stone not only represents the Zodiac, but that if placed in a proper position, would make a sun dial. Another antiquarian insists that it is not a calendar at all, lacking indispensable elements for the computation of time, but is "a votive monument to the Sun," and upon it sacrifices were offered. That the central figure represents the sun is certain and perhaps the year also. The Mexican month was composed of twenty days, which may account for the twenty figures placed in the circle immediately around it, the figures being hieroglyphic representations of the days of the month.

The illustration is from a photograph taken while the stone remained in the wall of the Cathedral, and shows the irregular extension of the stone beyond the borders of the sculptured design. It shows also that the art of mural advertising is practiced in modern Mexico and is no respecter even of the walls of the Cathedral.

The sacrificial stone is, like the calendar stone, of porphyritic basalt, of close grain, and is about three feet high and eight feet in diameter. The real name of this cylinder is the "*Cuauhxicalli de Tizoc.*" Tizoc was the ninth monarch of the Aztecan dynasty, and reigned from 1477 to 1486. The Cuauhxicalli (*Cuauhtli* — eagle, *xicalli* — drinking cup) is supposed to commemorate his victories over the surrounding tribes or nations. Fifteen tribes or nations were subdued by this predecessor of Moteczuma. The design upon the side of the sacrificial stone represents the conquering warrior with his hand grasping the hair of his vanquished foe, whose arrows are inverted. This design is repeated fifteen times. Each repetition is furnished with a hieroglyph denoting the name of the conquered tribe.

Upon the upper surface of the stone — slightly convex — is a figure representing the sun. In the centre is a small bowl-like depression drained by a narrow canal. The bowl and canal were intended to catch the blood of the victim sacrificed to the sun, and carry it off the stone; for the stone was used as its popular name indicates, as the altar upon which human sacrifices were offered. The order of nobles, known as "The Eagles" were the especial patrons of the sun, and the solemnities at which these sacrifices were offered were under their charge. Hence, the euphonious Aztec name given to this famous stone. In the times of the Aztecs the stone occupied a position upon one of pyramidal temples.

To enter upon any further explanation of these two remarkable specimens of Aztec sculpture would be but to repeat the somewhat conflicting theories advanced by the various Mexican archæologists, Leon y Gama, Chavero, Garcia Cubas, Orozco y Berra, Ramirez, Valentini, Bandelier and others, as to their meaning and uses.

Our illustration of the sacrificial stone is from a photograph taken while the stone stood in the *patio* of the National Museum, and shows behind it the hideous idol Huitzilopochtli; or, according to some, the front is that of Teoyaomiqui, an unknown female deity, and the rear side represents Huitzilopochtli, the god of war. Another (Chavero) calls the monolith variously by the euphonious names, Coatlicue (the woman with the skirt of snakes), Cihuacoatl (the serpent woman), and Cihuateotl (the god woman.) It is probably not important to decide precisely which of these the hideously carved block of jasper actually does represent.

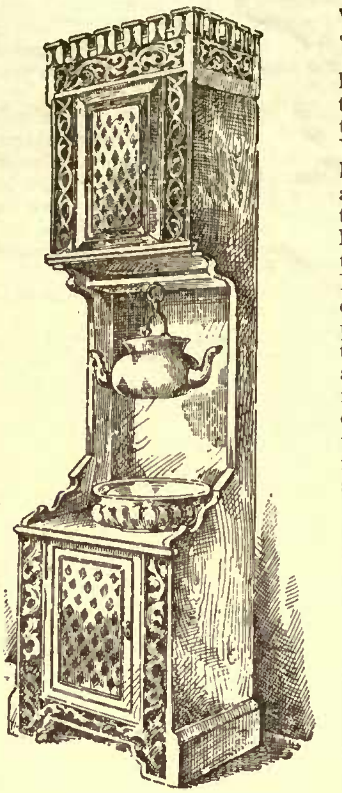
In the fall of 1885 the room opening directly behind this idol, as seen in the illustration, was fitted up for the reception of all the heavier relics of the Aztecs, and the calendar stone, the sacrificial stone, the many-named idol and others are displayed there to good advantage. About the same time excavations in the neighborhood of the great Cathedral discovered other sculptured rocks. The colossal head of a serpent was among them — probably a part of the exterior ornament of the wall surrounding the great temple, and known as the Cohuatipantli, or wall of serpents. These were, of course, added to the collection in the National Museum.

If the architect or decorator finds nothing suggestive or instructive in these specimens of Aztec sculpture, he might be more successful in a search in other rooms of the National Museum where are displayed the various forms of decoration employed among the Aztecs. The decoration of the interior walls of the ruined palace of Mitla in the State of Oaxaca, represents the architectural taste of a race long antecedent to the Aztecs. The pottery exhibited in the Museum shows curious designs employed in the earliest days which are still in use among the Indians who supply the cities with pottery. They are perhaps worth some study. Now and then one finds designs among them suggestive of the Greek or the Pompeian. Modern sculptors are inclined to reproduce the designs resembling those of the Mitta palace in their work for the city of Mexico. A notable instance of this is the pedestal of the recently completed monument to Cuauhtemoc in the Paseo de la Reforma, in which the modern forms and the primitive designs are combined with skill and satisfactory results.

ARTHUR HOWARD NOLL.

[1] See illustration in the *American Architect* for Sept. 19, 1885.

ART AND CONGRESSIONAL LEGISLATION.



Old German Washstand.

THE energy for which the American has of recent years become so celebrated has not been confined solely to the mercantile and scientific things of our national life. Within ten years American art has taken strides in the line of advancement unequalled by that of any nation in the world's history. From the comparative nothing of the Centennial Exhibition of 1876, it has suddenly sprung to a position of positive importance and relative worth in the eyes of the artistic world. And this, too, not by virtue of any fostering care on the part of our country and its people, but in the face of a materialistic age, in spite of philistinism, ignorance and want of encouragement; even in spite of bad Congressional legislation, the working of which has been and is a positive detriment to art progress.

The transition of American art from the crude ill-formed growth of some years ago to the present respectable product may seem to many to have been made easily, but such was not the case. There has been a battle against odds, a fight against imposed conditions, a struggle against many discouragements, not the least of which have come from our own people, individually, socially and nationally. As a nation we lay the flattering conceit to our souls that we grasp things quickly, that we adapt ourselves easily to circumstances, and that as a result we are far in advance in nineteenth century civilization. And, as a matter of fact, this is true in a limited sense. We do quickly appreciate the advantages or disadvantages of a political, mercantile or social movement, and we are far advanced in the scientific and commercial affairs of the century, but what price do we pay for our advancements in these respects? Certain it is that the law of compensation requires for an excellence in one direction a corresponding deficiency in another direction, and it is equally certain that our superiority as a nation in what is generally known as "business" has been purchased by our inferiority as a nation in art and literature. We are the admiration of the world in the one thing, but no one speaks or cares very much about us in the other. To be sure, thanks to a coterie of strong-willed literary workers, we have an American literature, but we are not a literary people, and though, thanks to a handful of determined, self-sacrificing artists, we have an American art, yet, again, we are not an artistic people.

Why is it that the shrewd American who so prides himself on his ready glance and bird's-eye view, has not recognized the importance of literature and art as factors in national growth and education? Is it that, like the giant of old, he is so long-sighted in one eye that he is very short-sighted in the other eye, and that literature and art are simply unfortunate in being on his infirm side? Very likely this is the case. The American is somewhat of a specialist, focusing his light through one glass which, though it burns where it touches, is, nevertheless, not an illuminating power to any extent. His chief speciality and hobby of late years has been "business." This has been his inseparable companion, who gets up with him in the morning, dresses and breakfasts with him, goes down town with him, stays with him the whole day, comes home with him at night, and lies down to sleep with him again. All roads lead to business, all pursuits have it as an object, all ambitions lie within its compass. No wonder that the American has become somewhat like poor Poll in his inability to voice more than one word, and somewhat like the mole in his inability to travel in more than one channel. It is a case of development worthy of scientific investigation. The crickets in the Mammoth Cave, from lack of use, have lost the power of seeing, and in the place of eyes have developed long antennæ. The American, though he is not utterly devoid of vision in any respect has, nevertheless, grown antennæ of preternatural proportions for matters of "business."

No, he is not totally blind: he has read his history and knows that of all the great nations of antiquity not one but was great in art and literature, and that of all their greatness these two features alone remain. He knows that no country has ever ranked high without them, yet he thinks his own country can be an exception. Besides, he argues, the age is materialistic: it requires practical things; the time of idealism and romance has gone by and realism has taken its place. We must adapt ourselves to the age. Art was a good enough thing for the Greeks and Italians, as poetry was a good thing for the people of the Elizabethan period. What the world wants now is energy in the business line and the ability to make money. And so the average American doubtless thinks that inasmuch as the accumulation of money is the chief aim of life, the poet would be better employed studying the internal essence of a stock-list and the painter would be a more useful member of society were he scribbling himself into a consumption over some broker's account books. No, he is not totally blind to the arts, but he might as well be, for while his antennæ are ever spread before him for a business venture, he will never use his eyes to see the beauty of light from above.

Now, this lack of sympathy on the part of the people which renders an artistic career in America so precarious (for without sympathy it is as hard for any calling to exist as it is for a flower to grow without water) is a something with which the artist has scarcely the right to find fault. It proceeds from sheer ignorance, which it is the artist's mission (if it be admitted that he has a mission at all) to dispell. His art must teach people culture and be its own reason for existence. That the individual cares nothing for painting gives the painter no good ground for complaint. But, when individuals banded together as society, in their legislative enactments pass laws designed to throttle the teaching process of the artist in its very inception, then the artist certainly has cause for complaint because the rights given him under the moral, the social, and the constitutional law are trampled upon. To be sure, the passage of such laws is simply the result of the primary cause, that is, ignorance on the part of the law-makers, but the ground of complaint cannot be pushed back to that starting-point. Ignorance *per se* is but a passive obstacle to be overcome if possible. Its effect, on the contrary, may be an overt act of wrong against which just action may be brought.

That a business-minded nation should send to its legislative departments people of a kindred nature to themselves and that these representatives should legislate chiefly in the interests of business matters is but the natural working of a majority rule. That the Government of the United States through Congress should appropriate moneys, build buildings, establish bureaus, equip services, send out commissions, and publish reports, all for the advantage of mercantile or scientific pursuits, is perhaps as it should be and doubtless for the greatest good of the greatest number. That the same Government should appropriate thousands of dollars for the benefit of Transit-of-Venus Expeditions, botanical gardens, and scientific museums, and that scarcely anything should be appropriated for the benefit of the fine arts (except as some political workers in the interest of a mediocre artist succeed in foisting upon it a bad picture or worse bust) is something that the friends of art may feel is ill-judged discrimination, but with which they may not find fault. That a man who invents some newly-fashioned match-box or washing-machine can command Congress and set the whole Governmental machinery in motion by his appeal, while the greatest author or the greatest artist we possess may crook his knee-hinges in the outer lobby of the Capitol unnoticed[1] is again prejudicial discrimination, but not a *casus belli*. The artists of the United States make no complaint that Congress has done nothing *for* them, but they do complain that Congress by its enactments has done much *against* them; that its actions have checked the growth of art education, have checked the incoming of art treasures into this country, have checked in some degree the production within our own borders of the best art. They bring no charge of passive negligence, but rather one of active wrong. Let us see if their charge can be substantiated.

In the year 1857 Congress took off all duty on art and left the makers of painting and statuary to their own unbusiness-like devices. What art was produced was of no consequence, and doubtless the honorable gentlemen from Arkansas and Mississippi thought that artists were mild-mannered simpletons who would better be allowed to pursue their way unmolested. In 1861 it became evident to the honorable gentlemen that the simpletons were adding to themselves recruits, that they were making a living in a queer sort of a way, and really they ought to be "protected" from the competition of grasping foreigners; so a protective tariff of ten per cent was imposed on foreign art, not, as we learn, at the solicitation of the "protected," but for the reason that Congress took a fatherly interest in its newly-born progeny. In 1883 the simpletons had grown to large proportions, they had builded up quite a business, an interest in art matters had been created, the revenue for 1883 on paintings and sculptures alone at ten per cent was $308,000. Art had become something worthy of Congressional thought, the artists were flourishing, but dear me! they were such a shallow set of unbusiness-like people that they would certainly dissipate their success in sudden failure unless the pernicious art and artists of Europe were kept out of the country. American art should be *strongly* "protected." So without solicitation on the part of the artists, without consultation with them, in spite of the remonstrance of a large body of them who wished no duty at all, the duty was raised to thirty per cent. The previous tariff had been complained of, yet was endured, but the imposition of the thirty per cent tariff immediately raised a cry of denunciation and opposition from artists and their friends everywhere throughout the country. As a result of opposition, the Belmont Bill, asking the repeal of the law of 1883 and in favor of no duty whatsoever on art, was the very next year placed before Congress and strongly advocated by the majority of artists through committees appointed for

[1] This is not rhetoric, but a fact. Congressional treatment of the Copyright League and the advocates of the Belmont Art Bill is not yet ancient history.

that purpose, but to no end. During 1885 and 1886 the popular indignation against this tariff manifested itself in many ways. The press everywhere called for its repeal, the President "strongly" recommended it in his annual message, artists at home and abroad who had never appeared in print before denounced it in open letters,[1] the National Academy of Design, the Society of American Artists, the Art Students' League, the Paint and Clay Club, the Boston Art Club and many other societies and museums, passed resolutions opposed to it. The Union League Club, through its art committee, went to the trouble of sending out circulars to all the artists, art-institutions and teachers of art in the United States, calling for their sentiments and wishes regarding the repeal of the tariff. The following is the published result of the canvass:

Number of artists in favor of free art, . . .	1197
" " 10 per cent duty, .	26
" " 30 " " .	7
" " a specific " .	33
" " partly free art, .	18
Whole number of artists heard from, . . .	1281

Of the 153 art-teachers and art-institutions that responded, 148 were in favor of free art, 3 in favor of partly free art, 2 of a ten per cent duty, and 1 of a specific duty. These data, expressing the almost unanimous wish of the artists and their friends for the repeal of the obnoxious tariff law, were once more presented to Congress and once more totally disregarded. To-day we luxuriate, thanks to our Congress, in a thirty per cent duty on foreign art — the works of American artists residing abroad and the art importations for public museums alone excepted. This is substantially the statement of fact.

Whatever may have been the reasons of the artists for asking the repeal of the tariff, or whether they had any reasons at all, it would seem as though such a unanimity of opinion coming from the "protected" would have immediately resulted in the favorable action of Congress. The artists were absolutely the only people to be consulted in the matter. They were the ones for whom the law was made and whom it was calculated to benefit; they were the ones alone interested and when they declared that they did not want protection, that it was a curse instead of a benefit to them, and they wanted it removed, Congress should have acquiesced in their wishes at once. Only one thing could have justified its prolonged retention and that would have been the necessity of taxation for revenue. But this was not put forth, and in fact at the time of the passage of the law and ever since the political problem has been how to reduce the enormous income of the Government. The artists by their unanimity of opinion were clearly entitled to the repeal of the law without giving any reason whatever. But they were not so arbitrary in their request. They preferred reasons and good ones, some of which it may be well to glance at again for a moment: —

It was urged then, and the argument is good now, that art should be permitted to come into this country free of duty on the ground of its educational benefits. No one entitled to sober consideration or respect has ever doubted for a moment that America is inferior in the arts to several of the European nations. There is everything to learn from the art of the latter, both by our artists and our people; therefore, let it come in, and let us welcome it. The more that comes the better for us. Everywhere it will awaken an art-spirit among the people which will redound eventually to the benefit of the American artist; everywhere it will give our artists an opportunity to study the methods of older and better masters. While our artists now think it necessary to go back to Europe every few years to see new models and methods, if foreign art were here it could be studied at home at any and all times. The existence of the tariff not only works as a prohibition upon modern pictures, but also shuts out ancient pictures valuable as illustrating art-history and for purposes of technical instruction. If the tariff does not prohibit foreign works, then its mission has failed and it should be abolished; if it does prohibit foreign works, then it trammels art-education in America, and should be abolished for that reason. If it is not ineffectual, it is an evil, and in either case should be done away with. To shut out foreign art is simply to diminish our art by making our artists weak. With no standards of comparison save their own, with no friction of mind upon mind, which is always a benefit, with no suggestions gathered from others (the most fruitful source of all inspiration), the artists simply fail to produce the best quality of work. As a consequence the interest of the people in art-matters fails likewise because of the withdrawal of that which stimulates it.

There has been some attempt to reason that the abolition of foreign art was a desirable thing, because "the art of America should be original and indigenous, and not an imitation of foreign schools," but the argument is so childish as to be scarcely worth noticing. As well look for a Shakespeare or a Milton in a Cheyenne Indian, as for a Rembrandt or a Velasquez in an untutored, isolated American. What great artist ever lived that had not the teachings of a master or a school? What nation ever produced art that had not its beginnings in the art of a preceding nation? What was, and is, the art of China shut off by herself for centuries? What was the art of America for the first hundred years of her isolated existence? In the last ten years it has sprung into sudden power, and why, if not that within that time, we have come into close communication with Europe? Originality and spontaneity are good things, but they are developed by training, not found by groping blindly in the dark. Men in all departments of life learn from the past, and add to their teaching that which is new in the present, thus producing what the world calls originality, but, which, in fact, is only a new application of old knowledge. As well talk of shutting out European laws, sciences and literature from our laws, sciences and literature, as to advocate the isolation of American art from that of Europe. It is a patent absurdity on its face, and the idea of it could have originated only with a mind unnecessarily ignorant of the nature of art.

Again, there has been some talk about the benefits the tariff confers by keeping out the "trash" from abroad, but just how it does so would be hard to demonstrate. The tariff works proportionately on all production, whether good or bad. If a thirty per cent duty will keep out a hundred-dollar piece of trash, it will likewise keep out a hundred-dollar work of merit; so the acting of the law is equally good or equally bad. A statutory enactment discriminating between things good and things bad would really be a very nice thing, but from its non-existence in the past, we may safely doubt the possibility of its existence in the future. There is but one law that may stamp things with approval or disapproval, and that is the law of public taste. Wares of all kinds find their proper level in the world's markets, and the American market can be no exception. If we are not good judges of "trash," it is not because our country does not turn out enough of it for us to judge by. There are more flimsy, bogus, swindling productions pushed upon our markets by Americans in one year than in all the countries of Europe put together; so we need not fear the "contaminating influences" of any foreign contagion, for we are well innoculated with our own. The American artist and the American people are not injured but rather educated by "trash." For, to know error is to recognize truth. The chromo and the Christmas-card have been the pioneers and missionaries of painting with us by awakening a love for decoration. To have these long before us is to recognize their shallowness, and after a time a desire for something better springs out of them.

Aside from the injury that the tariff is working American art, there is every reason why the law should be repealed on account of the humiliating position in which it has placed our artists before European artists. To the masters of France, Germany, England and Italy we are indebted for the excellent training possessed by our leading artists. The schools, academies and studios of those countries have been open to our people the same as to their own people. Their *Salons* and galleries receive and hang American pictures, and permit the painters of them to compete for prizes of value. They ask no tax, or duty, or charge whatsoever. Their great courtesy in this matter is reciprocated by our imposing a fine of thirty per cent on everything they may send to this country, which is a virtual warning that they must not do so again. At first there was not a little indignation among foreign artists at such cavalier treatment, and some action looking to the adoption of retaliatory measures toward our artists was taken out, but when it was explained that it was not the action of the latter but of their honorable representatives in Congress assembled who misrepresented them, the retaliatory measures were withdrawn and the former courtesies continue to be extended. But, in the face of such a state of affairs, it is not wonderful that the American artist feels like an intruder, a man who has insulted his benefactor and robbed his host, and it is not wonderful that he wants the tariff law repealed. The humiliation is deep to the artist and the reproach is upon us as a nation.

And what had Congress to say for itself in justification of the tariff law? A little of everything and not much of anything. Its members spoke somewhat of keeping out foreign "trash" as though they and not the artists were the best judges of "trash," as though they and not the artists were the best judges of the manner of keeping it out. The artists did not want the law, the Treasury did not want the revenue, and there was no possibility of either party in Congress stepping into a political mud-hole by raising the general tariff issue in taking off the tariff on art, because this was a special case where the issue could have been pushed aside on the ground of education. Still, Congress thought "protection" a fine thing whether the protected thought so or not. If foreign works were barred people would have to buy American ones. As though pictures were commodities like soap, wool and pig-iron, necessary to life, and as though American pictures could supply the demand for French pictures as easily as American soap could supply the demand for French soap. The absolute impossibility of the tariff working in such an analogous way would seem to be apparent to a child. An art-lover, for instance, wants a work by Millet, and the tariff law says to him: "Here is a landscape by Inness that will answer your purpose just as well." In place of a Rubens or a Rembrandt, we are told to buy a Chase or a Weir. Were pictures capable of reproduction like books, there were no great injustice in protection; for an American edition of Shakespeare substantially supplies the place of an English edition of the same author; but the case with pictures and sculptures is entirely different. The work of our American artists is good and should be bought for its own sake, and not as a substitute for foreign work. Under no circumstances could it be that substitute. Each picture is a distinct creation of one man. Nothing can replace it. Were our art as great as that of the High Renaissance, it could not act as a substitute or render undesirable the art of modern Europe. The very classification of art, with the products of mercantile industry and the attempt to apply the same

[1] See *The Critic* for December 19th and 26th, 1885.

rule to them both, betrays an ignorance of the nature of the former quite worthy of our representatives.

But the honorable gentleman from Arkansas and Mississippi were sure the artists were the ones who were ignorant and did not know their own business. Artists and literary people are so impractical; they have no head for business, and unless some one looks after them continually, they are likely to starve to death. They should be "protected." And so they have been in the same way the lion "protected" the lamb; the two lay down together, but the lamb occupied an inside berth.

What further reason did Congressmen give for their action? None whatever except some silly talk about "original and indigenous art" as though they again were the best judges of that and not the artists, as though they were the ones best conversant with art either spontaneous or otherwise. To tie a man hand and foot, and then ask him to show his agility; to take away a mechanic's tools and then ask him to produce good work, would not be less absurd than the requirement of Congress that American artists independent of foreign example should turn out an original and spontaneous art.

The injurious effects which have resulted from the tariff cannot as yet be properly estimated, because the law has not been working long enough to fully determine them. Certain, it is that American art has not retrograded since the year 1883, nor would it under more unfavorable laws than at present exist, because the impetus of its advance is sufficiently strong to overcome such obstacles. But there is no ascertaining how much greater progress it would have made had it been free to develop as its producers wished it to develop. That it has been hurt somewhat by the barrier raised against foreign art, is not doubted by those acquainted with the subject, though it may be admitted that the injury is more consequential than direct in its manifestations. To weaken American art by isolation so that its effect would be apparent to all, would, undoubtedly, take years to accomplish, but its results are no less certain at the present time, though we may not readily perceive them.

The tariff has acted as a direct prohibition to many buyers of limited means, and where it has not so acted with wealthy people, it has resulted in a loss of exactly thirty per cent of art to the country. That is to say, that for every $100,000 worth of pictures $130,000 are paid, whereby $30,000 that could have been spent in buying more pictures is turned into the already overflowing Treasury. The Government is a gainer and the people a loser in that proportion. It may be said that the loss falls only on the private buyer from whose picture-gallery the public derives no benefit. Let us illustrate that by two modern instances. In one winter twenty thousand people visited the private gallery of the late Mr. Vanderbilt, of New York. Was not the absence of thirty per cent, or even ten per cent of that gallery a loss to the twenty thousand, as well as to Mr. Vanderbilt? The recent gift of the Wolfe Collection to the Metropolitan Museum in New York is an illustration of the benefit the public derives from private galleries. It is valued at several hundred thousand dollars, but whose now is the loss that there is not from ten to thirty per cent more of it, the public's or Miss Wolfe's estate? The consequential injury to art-education by these losses must be apparent to every one.

A further injury has arisen from the tariff by making American art appear a contemptible product in the eyes of our own people. The very name of protection to many people is sufficient to condemn the thing protected, because the natural supposition is that it is a weak infantile affair not strong enough to take care of itself — a chicken just out of the shell which needs coddling and plenty of rest — and this is most decidedly what American art is not. It is perfectly able and capable of taking care of itself, and to-day it is not without honor save among some of its "protectors" in our own land. Our artists and their art are well-known abroad, and have received their meed of praise. They are not weak but strong, they need not the crutches of protection which have been thrust at them; they can walk alone perfectly well; but if our Congress will insist upon calling them cripples, why it cannot be wondered at that many people who do not know them should believe the insulting insinuation to be true.

Now, what American art and the American artists want of Congress and the Government is nothing more nor less than to be let alone. They have asked for nothing and want nothing except that Congress shall undo its unsolicited and ill-advised legislation. Governmental direction of the fine arts is not sought. It worked badly in France, a nation of artists, and it can be imagined how it would work here where ignorance of art-matters and political faithlessness go hand in hand. It might be a gracious thing for the Government to erect a building to be used as a National Gallery, but it has not been directly asked to do this, and even should it think wise to do so the structure through political jobbery would likely enough turn out to be another New York Post-Office horror not at all advantageous to art. Again, it might be a gracious thing for the Government to place prizes in the hands of a committee of artists to be awarded to successful art-competitors as in France, and to lend assistance to the promotion and advancement of art through its executive bureaus. Other nations of the earth cultivate art and find it not a bad investment from a purely mercantile point of view. France makes a large revenue out of it, and people flock to Paris mainly to see the art-treasures there. But however beneficial such a course might prove, the artists have not asked for it. All that is requested of Congress is that it undo what art-legislation it has done, and in the future leave American art to follow the even tenor of its way unmolested by legislation of any kind. Our art is abundantly able to fight its own way unaided and unprotected, like any other profession or calling not a capitalized industry.

John C. van Dyke.

BOOKS AND PAPERS.

It is a fact which no intelligent architect will undertake to deny, that the constructive masonry of the present period is defective in the proper and well-directed use of mortars and cements. This is due not altogether to a lack of good interest or a condition of positive ignorance on the part of the builders. The architects who have the planning and direction of the work are largely to blame. We fancy that engineers, as a rule, have better masonry constructions carried out under their care than the architects, even when working with the same kinds of men and material. There is no real excuse for this condition. The architect should understand and appreciate the materials with which he has to deal. There surely is as imperative a necessity for the employment of good mortars in the construction of a large public building as in a bridge or an abutment, yet this necessity is seldom fully appreciated, if we are to judge by the results. Architecture should call out the highest thought on everything which pertains to materials and appliances of construction to-day, in just the same manner in which during what we may term the golden age of art, the architect was master-mechanic as well as the unfolder of the artistic conception. It might almost be said that Rome owes her present architectural importance to the use of good mortar. Surely had the Pantheon or the Coliseum been constructed with the rash modern mixtures we are fain to dub as mortar, they would not be standing to-day. The architects of this preëminently practical nineteenth century seem strangely disinclined to use care in the selection and mixing of their cements and mortars; and when an architect seeks for information on the subject he invariably turns to an engineer. Whether it be beneath the dignity of the professional brother, or whether it be too profound a subject for the architectural mind to grapple with, we would not undertake to say; but the literature of the subject is by far too little studied, and architects, by their practice, admit a willingness to entrust the care of one of the most important chemical reactions, involving the ultimate stability of a building, to the hands of the first day-laborer who comes along. How many architects know the proper proportion of sand to use in mortar? How many even examine the lime or cement critically? How many understand the influence of salt, sugar, excessive freezing, too much water, too fat lime, or a badly burned cement, on the resulting mortar? These are pertinent questions, and such as every architect should appreciate.

But if architectural literature is deficient on such themes, engineers are quite ready to supply the lack. Aside from numerous large and comprehensive works on the general subjects of limes and cements there are many smaller publications dealing with individual departments of the topics and treating them exhaustively. To the last category belongs the recently issued work by John Newman, C. E.[1] It is written entirely for engineers and treats the subject from an engineering standpoint, discussing problems which occur only in engineering practice; still, by reason of its thoroughness, it might be of much value to the architect. Furthermore; it is limited in its scope almost exclusively to Portland-cement concrete, a material with which we unfortunately have comparatively little to do in this country.

Mr. Newman points a moral by observing that it is doubtful if any other material largely used in engineering structures requires in testing such constant observation and assiduous attention as cement. A difference in strength sometimes occurs between each cargo, and even in the same shipment or delivery; consequently a regular system of testing should be instituted. A simple test of the strength and character of neat cement is not necessarily a guaranty of similar powers when it is incorporated with sand; and a test of neat cement after being seven days in mould cannot be trusted; twenty-eight days should be the least period to elapse from the filling of the mould to the final test. How many architects would ever feel called on to give the time and attention necessary for such tests, even on the heaviest buildings? And yet our ordinary natural cements are much more variable than the manufactured Portland cement to which the author refers. The whole of Mr. Newman's chapter on tests is so practical in its nature and so sensible in its application that every building superintendent would be better qualified for his duties after having studied it carefully.

In all cases where concrete is to be exposed to dampness, it is quite desirable that the mixture shall be water-tight, which can only be when the exact relative proportions of cement, sand and stone are used. It is the common architectural practice to follow some rule of thumb deduced without reference to the conditions of any particular case; but when cements, to say nothing of sands and gravels will vary so much, it is quite important that exact relations be maintained. A simple method is given for determining the quantity of cement required in concrete: With the gravel, or stone, fill completely by shaking and ramming down a water-tight box or measure, the cubical

[1] "*Notes on Concrete and Works in Concrete,*" by John Newman, Assoc. M. Inst. C. E. London and New York: E. & F. N. Spon.

contents of which are known. Then add as much damp sand as possible, shaking it down amongst the gravel, the quantity of gravel, or stone, and sand being measured before being deposited. Then pour in as much water as the measure will contain; the quantity of water gives the net cubical contents of the cement required to coat the particles, which, however, should be increased by about ten per cent to allow for imperfect amalgamation, which cannot be so complete as the water, and to ensure that all the interstices between the sand are filled with cement. In a similar manner the volume of the interstices of the stone can be ascertained.

Mr. Newman writes from an English standpoint, and some of his figures relating to prices can be of only approximate value to American readers, but he makes some statements in regard to the comparative cost of cement and lime mortars which suggest that possibly similar conditions exist in this country without our being able to utilize them. Thus, at the Portsmouth Dock-yard Extension works it was found that a mixture of four to six parts of sand to one of Portland cement gave a mortar far superior to any that could be made with lime, and at slightly less expense; and that the adhesive power of mortar mixed in the proportion of eight of sand to one of cement, with the addition of a small quantity of lime, or yellow loam, to render the mortar more plastic and tenacious, was superior to lime mortar mixed in the proportions of two of sand to one of lime. At the Chatham Dock-yard works, ordinary building mortar was abandoned, and a mixture used of one part cement to seven parts of coarse, clean, sharp sand, and one part of foundry sand containing about ten per cent of loam, equivalent to about one and-one-half per cent in the mortar ready for use.

The book is purely technical in its character. The statements are terse, well chosen and to the point, nor does one have to wade through a mass of figures and hypothetical theories to get at the facts, a quality not always to be found in treatises of this kind. It is a business-like book for busy people.

THERE must be very few large schools or small colleges in this country which do not maintain one or more publi ations of one kind or another, and if they are not the kind which undertake to lay down the law upon every subject and prefer to stride haughtily along on stilts than scuffle honestly along through every-day dust, they do a world of good. They form records for the future, they knit more closely together the boys who make and maintain them, and when they fall into the hands of elders they help to show how the coming generation is preparing to take up the work which they soon must drop. If not too stilted or too insipid, but frank and boyish they are a charming form of publication to pick up and read — now and then. When we received some time ago a notification that the students of the Architectural Department of the Institute of Technology proposed to establish a publication, we wondered which of several possible courses would be selected, and had a premonitory shudder at the idea that we might be treated to another exhibition on stilts, and asked to read in humbleness of spirit the latest gospel of art as preached by those just crossing its threshold. But instead of this we find the modest statement that the *Technology Architectural Review*[1] is to be "essentially a portfolio of plates and not of text,' which will "aim to call attention to and emphasize the resources of Classic architecture," and will "offer to American draughtsmen an academic model at a price within the reach of every one," and we find this statement confirmed by the inclusion in this initial number of four gelatine prints which show reproductions of successful school problems executed as washed drawings. The idea of the publication is a good one; an "academic model" is in many ways a most desirable thing to have within reach, and if these young men can interject once a month into the hurly-burly of the "picturesque" or "cottage" architecture some designs that will show that proportion, mass, subordination of parts and, above all, refined simplicity are things that are in these days believed in and studied, even if only within the walls of a school, they will have deserved as well of their times as other reformers have of theirs.

We will not distress the promoters with any forebodings as to what will become of the *Review* when those who have founded it have taken up the realities of an architect's life, but we think we may offer the suggestion that if the plates are intended to be primarily souvenirs of the achievements of fellow-students, pleasant records of an all too-fleeting time of probation, a greater number of designs, reproduced in a less expensive style, would better please the majority of the editors' constituents, while, if it is really intended to call the attention of outsiders to "the resources of Classic architecture," an endeavor should be made to have the scale of prints large enough to properly show what the resources are. To those who have enjoyed this kind of academic training, the three drawings which go to make up the usual *rendu* of a programme are intelligible enough, but the outsider would find more real instruction in one set of drawings, "with details to a larger scale."

A VERY different publication is this next one, and yet it is an architectural journal put forth by men who also believe in academic models and the worth of Classic architecture — at least in the school period. It is the new weekly journal, *L'Architecture*, established by the Société Centrale des Architectes Français, one of the most energetic and progressive architectural associations in Europe. The list of the Society's undertakings is not a short one, and it has been induced to add one more to the number in the establishment of this journal, because it was found that the monthly *Bulletin* had a circulation almost exclusively amongst members of the Society, and so had no external influence, and was, moreover, at the disadvantage in which monthly periodicals always find themselves in dealing with matters of current interest and importance. The working organization of the Society is extremely good, and to the several "sections" are referred matters pertinent to them for treatment in a more efficient and prompt manner than would probably attend the deliberations of the entire body. Consequently arises the necessity that the main body should receive reports of the action of its several sections promptly, and it is to furnish a vehicle for the publication of these reports that *L'Architecture* has been established. All the other matter that usually finds its way into an architectural publication will be found here, but the central fact will always be in evidence — that the journal is official, but official in the French sense, which is somewhat different from that in which we often use the word, which comes pretty near to being "organic."

The three things of most importance that the Society has accomplished is the compilation and publication of the "*Manuel des Lois du Batiment*," the establishment of the *Caisse de Défense mutuelle des Architectes* and the publication of the *Série de prix*, or official price-list of building-materials which has no counterpart in this country, but which in France is used by every contractor in making his estimates.

Another worthy feature of the Society's work is the manner in which it interests itself in the mechanics who carry out the designs of architects and seeks to encourage friendly relations between the head and the hand, as it were, as well as to encourage individual ambition by the bestowal of numerous medals and rewards.

We believe that we shall find the new journal as welcome a visitor as are the other two architectural weeklies whose establishment some years ago was so marked a new departure in French professional publications.

[1] *The Technology Architectural Review*, published monthly during the school-year — eight months — by the students in the Architectural Department of the Massachusetts Institute of Technology.

COMMUNICATIONS

AN OPENING FOR AN ARCHITECT.

NEWARK, N. J., March 6, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — Will you kindly do me the great favor to tell me your opinion in regard to the following:

I am a young architect intending to start business for myself in any city of the United States, and want to know some cities which may be the most suitable for this purpose both according to rapid increase in population and wealth and according to a healthy climate. I dislike to take up your time, but would be happy to hear your advice in this case. Very respectfully yours,

INQUIRER.

[SAN Diego, Cal., possesses the necessary climatic recommendations, and the newspapers of that city assert that there is a "building boom" of large proportions now asserting its sway. We advise our correspondent not to go to such remote parts without further inquiry.—EDS. AMERICAN ARCHITECT.]

DISREGARDING THE LIMIT OF COST.

NEW YORK, N. Y., March 5, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — I have just learned the result of a competition in which I was engaged with others for a church at Newark, N. J. The terms of the competition placed a limit of cost $90,000. I have heard that the accepted design is likely to very far exceed this limit. If this is so, is there any redress for the other competitors, most of whom were naturally careful to keep within this essential condition of the competition.

I ask this question because it is an oft-repeated experience. Not long ago I had the misfortune to stand No. 2 in a competition for a high school building, limit of cost as stated $20,000. I was most careful to keep within the limit. The accepted design cost $35,000 as I was afterward told, and trustees were obliged to apply for additional funds. Ought there not to have been some redress? Now, for this church, twenty designs, which probably represent $4,000 worth of labor, were submitted. If there is any element of unfairness in the verdict, especially such an element as this, should there not be a Portia or Daniel to come to judgment in our behalf.

Respectfully yours,

COMPETITOR.

[THE persons proposing the competition are bound by the terms they offer, and in the case of a very glaring violation of the provision for limit of cost, could probably be made to pay all the competitors who followed the terms in good faith a fair price for their work. At the same time other terms of the competition are very often incompatible with the limit of cost specified in the same programme, and it would certainly not be for the interest of the profession to hold too closely to a limit of cost on work shown by competition sketches. We should say that a man who got a sketch for a thirty-five thousand dollar building accepted in a competition for one to cost twenty thousand had practised a successful fraud, but a certain margin ought fairly to be allowed.—EDS. AMERICAN ARCHITECT.]

A QUESTION OF COMMISSION.

Columbia, S. C., March 7, 1888.

To the Editors of the American Architect: —

Dear Sirs, — I write to have you decide for me the proper charges, under the conditions that I will endeavor to state briefly and clearly below. You can reply either by letter or through your valuable journal.

Let me at first say that in this town, which is my home, there is but little chance for an architect, as every man who builds "wants the most house for the least money," and usually thinks he can plan a *better* house for himself than any one else can plan for him, so, with the assistance of a builder and "*Shoppell's Homes,*" he goes to work.

In consequence, to keep employed, I make the plans and then take the contract *when I can get it.* If I get the contract, I make no charge for plans, specifications, etc., but when I do not, I am entitled to some compensation for services. Now, under these circumstances, I want to know what should the charge be, as I have many cases of this kind? The case in question is like this:

A friend comes to me and says he wants to build; he knows that I *design* and *build* houses. While he does not say that he wants me to design his house, and consequently says nothing about charges, he readily gives me his ideas and his own diagrams, and allows me to make "eighth scale" plans of his house, which, after much discussion and several changes, and writing and rewriting the specifications to reduce the cost, he accepts. At this stage, two bids are taken, and mine is $150 high. The contract is given to the lower bidder. I will add that the plans were eighth scale "pencil sketches." The specifications were written in ink. The elevations *are* on *my* table. This is, I believe, a fair account of a case, and as I wish to settle the matter *justly,* I have agreed to have you decide upon my charge. By an early reply, you will greatly oblige,

Very truly yours, George W. Waring.

[Eighth scale sketches and specifications for a house to cost less than ten thousand dollars ought to be worth four to six per cent on the proposed cost of the house. If, however, a man is known to be in the habit of furnishing sketches as an inducement to owners to contract with him for building, we doubt if he could oblige any one who had not made a contract with him to pay him for the sketches furnished unless some arrangement or notice preceded the furnishing of the plans. — Eds. American Architect.]

NOTES AND CLIPPINGS

An Old Miner's Tales. — "There are many strange things connected with the Comstock Mines," said an old resident of Virginia City yesterday. "You must recollect that while the main workings extend from the north of Gold Hill to Virginia, and below, a distance of three miles, there is a total of 252 miles of tunnels, drifts, stopes, sumps, quips, and turns, making up the interior workings as a total. Think of it — 252 miles; farther by far than from the Golden Gate to the Nevada line, and farther than across the great State of New York. Why, look around a little. You might go as far from Washington, D. C., as to Baltimore and back again and you wouldn't be much more than half through the Comstock. Then when you think of the great depth of these mines, the gigantic, incomprehensible weight of the mass resting upon the timbers, and the travelling mountain in which are these mines and on which is Virginia City, you involve propositions again that have stumped the deepest thinkers. For instance, queer polished sticks as smooth as mahogany and no thicker than my cane are every once in a while being taken out of the old workings. They are as hard and as heavy as iron, and a knife will not make a mark on them. Now, what are they? Originally they were 12-inch solid timbers, and the millions of tons bearing upon them in all directions, perpendicularly as well as laterally — for it is only in this way that mines can be timbered — have pressed them to this shape. They are found sometimes in bits, sometimes in long pieces, take nout where caves have occurred and the workings displaced. No known mechanism at present nor in any age of the past, so far as history recounts, has such power to compress and work marvels with wood. The silent old mine has stumped the scientists. You have asked me if it is really true that Mount Davidson is slowly travelling eastward, with the town of Virginia on her back and her mines within. It is true, and this again has set our ablest men to scratching their heads. By the careful estimates of engineers it is seen that Virginia City has travelled down hill 10 feet in 15 years, or about two-thirds of a foot a year. It is concluded that it is owing to the vast underground workings. But just how it is done is problematical. At any rate, however, the people of Virginia City are not afraid of the trip they are taking. They have been with it too long to get alarmed about it now. In the Consolidated Virginia and California mines of the Comstock was another strange thing, too, that for a long time caused much deep study and a vast expenditure of money. The fires which broke out there on the 1,500-foot level years ago and burned for years seemed inextinguishable. Every known means was tried. There was a large body of superior ore there, as many will remember, and the owners were anxious to get at it. It was no use, so they put in seven solid feet of a bulkhead and shut it up. It burned for seven years, and it was only a year ago that carbonic gas was injected by means of costly machinery and the hidden fires put out. The gas in there was so deadly that not a man could approach it as it was escaping. It would have been instant death. Now the best ore of the Consolidated Virginia and California is coming out of that place where the unseen fires long raged." — *San Francisco Examiner.*

Conquering a Quicksand. — While boring with a diamond drill for the foundation of the Quaker Bridge dam for the new extended water-works of New York City, the work was embarrassed by striking a quicksand which prevented them from obtaining a section of the geological formation of the earth beyond that point. Chief Engineer Benjamin Church, in charge of the work, withdrew the drills, and making a very fluid grout of cement, poured it down the bore, and waited a few days for it to harden before resuming work with the diamond drill. The cement completely filled the passage-way across the quicksand deposit, and the diamond drill, removing the interior of this block of cement, proceeded without any difficulty through the sustained formation on the other side of the quicksand. — *Engineering.*

The Sarcophagus of Alexander. — I get to-night from Constantinople, through Minister Strauz and Secretary of Legation Pendleton King, an interesting statement concerning the sarcophagus of Alexander the Great. In May of last year Hamdy Bey discovered in the course of excavations at Sidon eleven sarcophagi — four Phœnician and seven Greek. The former had been already described and illustrated in a French archæological journal, but Hamdy saved the Greek ones to make a book about them, which will appear a few months hence. All these are now in Constantinople in boxes, and will be exhibited as soon as a fitting room can be prepared. One of the Greek sarcophagi is of such huge proportions, magnificence of sculpture and coloring, that from the start the discoverers first assumed it to be the tomb of some Assyrian king. But Hamdy devoted deep research to the work of studying the sculpture, and concluded finally that the sarcophagus was that of Alexander the Great. Its sculpture, on this theory, represents the battle of Arabela, a lion hunt, and the battle of Granicus, all the relievos being splendid and of almost unexampled artistic merit. The sarcophagus is nearly 12 feet long, 7 high, and 5½ broad, and the total weight is 25 tons, of which the cover weighs 10. It is all of fine Parian marble. A photograph of it has been sent to a number of French savants, including Renan, and some of them are now there studying it. — *Correspondence of New York Times.*

The American Expedition to Babylonia. — An expedition to excavate one or more of the ancient sites of Babylonia has been organized in Philadelphia. This expedition is the heir and successor of the Wolfe expedition, which was sent out from this city by the liberality of the late Miss Catherine Lorillard Wolfe. That expedition, headed by Rev. Dr. W. Hayes Ward of the *Independent,* did a preparatory work with a view to future developments. As a result of its labors this American expedition has been organized in Philadelphia, which proposes to excavate what the Wolfe company was able only to explore. The money for the present occasion has been contributed by public-spirited citizens of Philadelphia, working in connection with the University of Pennsylvania, the latter institution having accepted responsibility for the expedition, and arranged for a proper working up of the results. The director of the expedition is Rev. Professor Peters of Philadelphia. Dr. Hilprecht, professor of Assyrian in the University of Pennsylvania, represents what may be called the home staff, charged with the duty of scientific publication of all texts found. Dr. R. F. Harper of Yale University and Professor Rogers of Haverford College also will be of the company. Names of other members of the staff have not yet been made public, nor has the exact locality been designated where it is proposed to excavate. Further details will probably be furnished later. It is understood, however, that the plan of operations determined upon by the University of Pennsylvania is so broad and liberal as to allow all American institutions, so desiring, to avail themselves of the advantages offered by this expedition. — *N. Y. Evening Post.*

Dr. Schliemann's Explorations in Cerigo. — Dr. Schliemann left Athens on January 27th for a three months' journey of exploration in Egypt, in company with Professor Virchow. Before the arrival of the latter, Dr. Schliemann intends making a thorough study of the topographical points of the old town of Alexandria. A report on the remains of the ancient Temple of Aphrodite in Cerigo has been sent by the discoverer to the Berlin Society of Anthropology. A fuller description, with plan and sketches, will appear in the *Mittheilungen* of the German Institute for Archæology at Athens. Meanwhile, we are enabled to state that the site of the old temple is identified with that of the Church of the Holy Cosmos. It is situated nearly in the centre of the enclosure walls of the old town of Cythera, and it appears that the stones of the ancient sanctuary almost sufficed for the erection of the church. The temple was a closed structure made of tuff-stone, with two rows of Doric columns, four on each side, of extremely archaic style. They are all still preserved in the church, with their capitals and ornaments, but only two of them, as well as the base of a column, are now *in situ.* The columns also are of tuff-stone. On a hill-top in the neighborhood, which is about thirty metres higher, there are remains of Cyclopean fortifications. Dr. Schliemann thinks they cannot be older than the seventh century B. C., seeing that he did not find there any potsherds for which a higher age could be attributed. All former excavators have sought for the temple of Aphrodite on the lower terraces of the hill-range, but in vain. When digging there, Dr. Schliemann laid bare a mass of large building-stones, but these appear to belong to a wall-tower of the Macedonian period. The great enclosure wall ("peribolos") of the town, which is formed of the same material and is in the same architectural style, evidently dates from that epoch. For a long time this wall has been used by the inhabitants as a convenient source of building material, nevertheless, there are still considerable remains in several places. In the old harbor town of the island, at Scandeia, Dr. Schliemann also made excavations, but without finding anything of interest. There are nowhere else any artificial mounds to be seen in Cerigo. — *London Academy.*

S. J. Parkhill & Co., Printers, Boston.

Copyright, 1888, by TICKNOR & Co.

HELIO-CHROME

HELIOTYPE PRINTING CO. BOSTON.

DOORWAY ON COMMONWEALTH AVENUE, BOSTON, MASS.

THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. XXIII. Copyright, 1888, by TICKNOR & COMPANY, Boston, Mass. No. 639.

MARCH 24, 1888.

Entered at the Post-Office at Boston as second-class matter.

CONTENTS

THE announcement of the approaching birth of some new architectural or building periodical — and during the last few years the mountain which produces them has been kept in a constant condition of parturition — fills us each time with a mild astonishment, which is often not lessened when we come to examine the first copy that comes to hand; for, as often as not, the question that occurs to us is: "Well, why is not this as well worth while as most of the others that are published?" and not as perhaps it might excusably be: "What is the use of this, it is just the same as, and not any better than half-a-dozen others?" Progress is suggested, and we often take up the first issue of this journal and reflect with mixed feelings on the great difference between the attitude which the public holds to-day toward architecture and its professors and that which it held a dozen years ago, and smile with some spice of grimness at the inequalities of fortune which caused our own early career to be such a struggle, while it allows those that come after us to adopt at the outset those features of the value of which they had the evidence before them which our own success afforded. How far it is safe to carry the mania for establishing new journals of nearly identical character, and all looking for support to the same profession and trades, and to the same set of advertisers remains to be proved. The changes we constantly notice in the names of the publishers of these journals show that the struggle for existence is now and then too sharp to be endured by the founders who seem to be quite willing to transfer to their successors the unprofitable pleasure of publishing a journal which does not pay its own expenses.

WE believe that the subscription and advertising fields open to architectural and building journals are very definitely limited and of slow growth, and that the more hands that undertake to gather the crop from this restricted area the less of a crop each will gather, and the less of it in each case will go to the making of that brawn and sinew necessary for prolonged existence when it comes to a question of the survival of the fittest. We do not mind stating frankly that it is our purpose to secure for ourselves as large a share as possible of this crop, and we have never slackened in our endeavors that our performance might deserve the meed that our desire covets. To that end we have made changes and improvements, which inured to the benefit of our subscribers, as often as circumstances permitted, and it is in the hope that the means of making further improvements may be secured to us that we have incurred the cost of printing to-day a full edition of a helio-chrome subject — usually included only in our Imperial edition — so that subscribers to the other editions may form an idea as to what a helio-chrome print really is. The prints produced by this process in their delicacy of effect and accuracy of coloring give, we believe, a truer and more satisfying impression of architectural subjects than those produced by any other process known to us: we do not believe, for instance, that any one can discover a better architectural print than the helio-chrome included in the "*Trinity Church Monograph.*" The larger the edition, of course, the less will be the relative cost of manufacture, and so it is quite possible that while leaving our net income the same a larger edition might make it possible for us to give our subscribers a better return for their money even than we now do. As to the question of money's worth, we chanced to ask the publishers at the close of last year what would be the proper retail price of a book of the size and quality of a bound volume of the *American Architect*, and were rather surprised at the moderation of their hasty estimate, which was "Not less than thirty dollars"!

MR. JAMES W. PIRSSON, a well-known architect of New York, died in that city recently. Mr. Pirsson with his no less distinguished partner Mr. Hubert, may be said to have almost created the system of apartment-house building which flourished in New York for so many years, and brought the firm the highest reputation. Their first venture, and the earliest apartment-house on the modern plan, which, with the exception of the Stuyvesant Flats, had been erected in New York, was an extremely pretty and well-planned structure on Madison Avenue, at the corner of Twenty-eighth Street, if we remember rightly. This building was for some time the talk of the town, and, as it proved very profitable, Messrs. Hubert, Pirsson and Company were soon commissioned to plan and build others. Becoming deeply interested in the problem, they succeeded in developing what was then a perfectly novel type of building, but infinitely superior to the old-fashioned block with central court-yard which had done duty for "combined habitation" for so many years. In a "Hubert-Pirsson" apartment-house there are no enclosed courts, filled with stagnant air from one end of the year to the other; but every window opens into the outside air; every apartment has its own front and back entrance, and every portion is lighted and aërated with a thoroughness rarely found in city houses. One of their devices, which proved very popular, was the "mezzanine plan," in which the bedrooms formed a separate block, three stories of bedrooms corresponding in height with two stories of reception rooms, and providing, within a given height one-half more bedrooms than could be obtained by the ordinary plan. As the demand for such apartments grew, various schemes for building by stock companies, formed from among the persons who wished to live in them, were invented, and Messrs. Hubert, Pirsson and Co., are said to have been the most intelligent and persistent promoters of the legislation by which persons wishing to do so were enabled to acquire a good title to a piece of real estate bounded by two horizontal planes, as well as by the vertical surfaces forming the walls. Among the many apartment-houses built by the firm, nearly all of which are in the most fashionable part of the city, are the one just mentioned, on Madison Avenue, another nearly opposite, the beautiful Chelsea Flats, and the vast block known as the Central Park Buildings, one of the largest and most carefully planned structures to be found in any country. This was among the last of the great apartment-houses, and the firm turned its attention to other buildings, designing the Lyceum Theatre and many other structures of note. Mr. Pirsson himself was a very popular and amiable man, a painter and musician as well as an architect, but a thorough architect nevertheless. He was among the early members of the American Institute of Architects, and always maintained a high standing in the profession. His death, at the early age of fifty-five years, will be greatly regretted, both among architects and in society in New York.

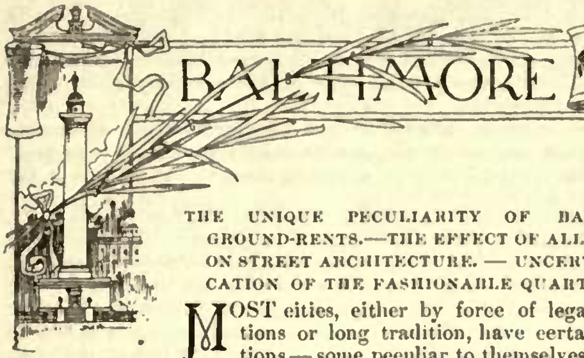
SOME of the newspapers of the protectionist persuasion have been saying a good deal lately about the impropriety of removing the duty, of twenty per cent ad valorem, on cement, as is now proposed in Congress; and point with earn-

estness to the sixty thousand persons who, as they say, derive their living from cement manufacture in this country, and who would have to suffer a reduction in their wages to correspond with the reduction in price which would follow the removal of the duty. In general, we are very little disposed to assume any political opinions and still less to profess a knowledge of the science of political economy, but as architects and builders we have an interest in everything which may affect the art of construction, and a change in the price of cement would certainly affect that art in some degree. It seems hardly likely that a reduction of the cost of the imported cements which are, of course, nearly all Portland or the costly Keene's or Parian cements, would influence the price of the native material from the Rosendale and the Louisville quarries, as this would always be cheaper than the artificial cements; so that the working people of Rosendale, Akron and Louisville need not fear an immediate loss of income from foreign competition; but it is quite probable that the Rosendale manufacturers, finding that they had now more to fear from the superior quality of the Portland cement, would turn their attention to making better use of their own unrivalled natural material, by more careful preparation, better mixing and better grinding, to the great benefit of all persons concerned in building. As to the American Portland Cement, it must be confessed that the change in the tariff would bear hardly on a native industry which has been developed and carried on with a care and conscientiousness not often found in connection with protected industries; but the art of building is certainly suffering in this country for want of a more general employment of Portland cements, such as a twenty per cent reduction in price would be likely to favor. We have now our faces turned toward solid and enduring architecture, and in these days a solid construction is more a matter of cement than anything else. Cheap Portland cement means stairways of artificial stone inside and outside our houses; pretty and inexpensive tiling for our basements; monolithic sidewalks and garden paths; imperishable masonry, and easily constructed fire-proof flooring. All these things are commonly used where Portland cement can be had at a price not artificially enhanced by protection; and it is time that Americans should be able to enjoy the same comforts.

A CURIOUS scheme has been devised for utilizing the water-power of Niagara Falls, which, it is generally conceded, is now "running to waste," and a company has actually been formed for carrying it out. The main feature of the plan consists in the construction of a tunnel, by which water is to be taken from some distance up the river toward Lake Erie, carried under the town of Niagara, and discharged into the channel of the river below the falls. It is calculated that out of the seven million horse-power which, it is said, the river can supply, one hundred and nineteen thousand can easily be diverted by the tunnel and utilized to drive a series of turbine wheels, two hundred and thirty-eight of which, each affording five hundred horse-power, will supply as many mills with a motive force which will be unaffected by weather, cheap and perpetual. The cost of the tunnel and wheel-pits is estimated at three million dollars. We suppose that fifty dollars per horse-power per year would not be an extravagant estimate of the cost of steam-power for mills when furnished on a large scale, and if steam-power were furnished night and day, this cost would be about doubled, yet if the new company could sell power at one-half this rate, or twenty-five dollars per horse-power per annum, its income would just about pay the cost of the whole undertaking every year.

THE *British Architect* contains a remarkably clever bit of writing worthy of Mr. E. W. Godwin's caustic pen upon "Architectural Biographies," which gives some hints about the sort of literary work that architects might do if they wished, which are well worth remembering. The occasion of the article seems to be to make a little criticism upon the recently-published "*Recollections*" of Sir George Gilbert Scott, and the book certainly appears to deserve criticism. The reviewer quotes Sir Gilbert's tedious and awkward description of the ceremonies attending his own knighting, and then sarcastically laments that he had not told his readers, instead of all this, how to distinguish good lime from bad, or how to test the qualifications of a new clerk-of-works, or how he acquired the special information which must have been so useful to him in the many competitions in which he participated. As the writer well says, every architect of experience gathers up for himself a great store of information, which might easily be brought into permanent form for the use of the profession, but is almost always lost. An architect, for example, who proposes to enter a great competition, usually gathers plans, visits buildings of character similar to the one to be erected, makes notes, inquires into the merits or defects of each, and in this way gains an immense amount of useful information on this subject, which serves him once and is then thrown away without being made of the smallest service in advancing the knowledge of the profession. It is true that few architects like to write, but there are some who do, and it is a pity that these should find nothing better to describe than the conduct of the aristocratic persons whom Sir Gilbert Scott met at Osborne Palace, or the bad dinner which Mr. Street ate at Colico. There are, happily, some exceptions to the rule of architectural writing. Mr. Wightwick's "*Hints to Young Architects*," for instance, gives exactly the sort of results of experience in professional life which beginners need, and though rather antiquated now, it is still an extremely useful and interesting book for the persons to whom it is addressed. Mr. J. T. Micklethwaite's "*Modern Parish Churches*," although hardly so practical, and rather unpleasantly aggressive in its references to some indefinite persons about whom most readers know little and care less, is another useful book. But a great deal more might be said on this subject, and at least an equal amount about many others, such as railway architecture, theatres, school-houses, municipal buildings, and so on. To take more restricted subjects, what could be more useful than a book, illustrated with photographs and carefully-colored plates, and purged of all rhetoric, poetry and Ruskinian rubbish about mosaic and other interior decoration. We have the decoration in huge books, like the recent publication on Saint Mark's Church at Venice, but these vast monographs are generally open to some suspicion as to their fidelity in color, and, at best, have little of the life and inspiration of a book such as an architect, studying such matters, could write. Some years ago the late Mr. Richardson, who was then full of interest in his work on the Albany State House, where Mr. William Hunt had just been engaged for the decoration, projected a tour through Italy and Sicily, in which Mr. Hunt and himself, a favorite pupil of Mr. Hunt. and the present writer, were to devote themselves to studying colors and effects at Venice, Ravenna, Rome and Palermo. The project was defeated by the illness and death of Mr. Hunt, but it is easy to see how the history of such an expedition as this, if well illustrated and written with the desire of being useful, and as little reference as possible to dinners, black-eyed houris, Bacchus, Somnus, Gambrinus and other dieties of the cheap newspaper reporters, might be of real value, There is at present next to nothing in the way of useful books on decoration. Some few works can be had with colored illustrations, bearing a remote resemblance to the objects they are supposed to represent, but an intelligent treatise on principles, with faithful illustrations of the application of the principles, such as Dr. Christopher Dresser or Mr. William Morris could write does not exist, and the science of decoration now consists of a few plausible, but generally untenable maxims, joined to and frequently contradicted by the experience and feeling for color of each individual practitioner.

THE Paris Exhibition of 1889 is to be enlievened with an archæological-architectural department, which has now been placed under the direction of M. Charles Garnier, illustrating the progress of human habitations from the earliest ages to the present day. The series will begin with cave dwellings, to be followed by huts, and these by structures of succeeding architectural styles, and each dwelling is to be shown inhabited by persons dressed in the prevailing style of the period which his house represents. The Parisians are already speculating on the sort of appearance which a *manant* from Montmartre or the Boulevard Saint Michel will present in the garb of a cave-dweller, or the toga of a Roman citizen, but if well done the exhibition is sure to be interesting. The idea is undoubtedly taken from the Old London exhibit at South Kensington, which was one of the most amusing and popular portions of the successive exhibitions there, but the Paris scheme is much more comprehensive than the other.



THE UNIQUE PECULIARITY OF BALTIMORE GROUND-RENTS.—THE EFFECT OF ALLEY-WAYS ON STREET ARCHITECTURE. — UNCERTAIN LOCATION OF THE FASHIONABLE QUARTER.

MOST cities, either by force of legal restrictions or long tradition, have certain conditions — some peculiar to themselves, some in common with others — governing the laying-out and use of their highways and the form and dimensions of their building lots, and which to a large extent influence the arrangement and style of the buildings themselves. Among American communities, Baltimore prides herself upon being unique in her system of irredeemable ground-rents, which system, in her reverence for antique customs, she is said to share alone with the ancient city of Jerusalem. This system, though quite childlike in its simplicity, may not be perfectly familiar to outsiders, and is quite distinct from the ordinary mortgage. The owner of any piece of ground in the city may borrow any sum of money he may find any one willing to lend him, say one thousand dollars, at any rate of interest he may fix, say six per cent, giving his piece of ground of so many feet and inches in return for it. This creates a "ground-rent" of sixty dollars a year on that particular piece of ground for ninety-nine years, renewable forever, which must always be paid to *somebody* by whoever shall thereafter purchase that bit of land, and buildings or improvements of any kind, at any time placed upon it, become additional security to the owner of the "rent" for his sixty dollars yearly interest, and they may be sold in case of non-payment of this "rent." Both the ownership of the "rent" or of the ground and the buildings may change hands any number of times independently of each other, the same relationship always existing between them, and the "rent" may be sold for a greater or less sum than the original one thousand dollars, as the fluctuating value of the ground may make the sixty dollars a higher or lower rate of interest.

It is obvious what an excellent investment these rents are when only safety and a fixed and moderate income is desired. The very large amount of Baltimore capital that is buried in them, which might be more advantageously employed in commercial or manufacturing enterprise, is somewhat typical of the traditional spirit of the community. The result upon business transactions is also apparent, as it is often difficult to obtain in any desired locality a piece of ground "in fee" — free from the incumbrance of a "rent" — and there is a natural aversion to making very extensive or costly improvements upon land that is not absolutely in the control of the owner of the building, whereas, for less expensive improvements, erected more particularly with a view to leasing, the same objections may not necessarily hold good.

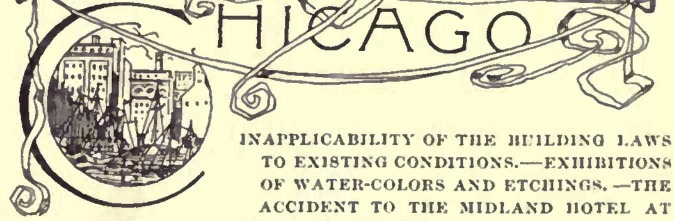
So much for one of the conditions that always has and possibly always may peculiarly influence building in Baltimore. There is again another that differentiates her from cities platted as New York is, for example, where the dimensions of the blocks between streets give almost invariably the same depth, forming building lots of uniformly one hundred by twenty-five feet, not usually having any approach from the rear by either public or private alley-way, and the only means of access for all purposes being by the one front upon the main street. This has developed the almost universal system of front "areas" to the New York house, which keeps the front wall by so much farther back from the curb of the driveway, and the long and high steps or "stoop" finding ample room for itself in the width of the area, the sidewalk is kept free from all obstruction, and we believe that by law no features of any kind, for utility or ornament, are permitted to extend beyond the true building-line, which is usually the front line of the area. This has also developed a great uniformity of twenty-five foot width of dwelling, varying only where two or more lots of this size are thrown into one.

In Baltimore the distance between the streets is very variable, from two hundred to sometimes almost four hundred feet; there is also no fixed width for the building lot, from fifteen to fifty feet — averaging from twenty to thirty. Between and parallel with nearly all principal streets run alleys, ten or twenty feet wide, forming a subordinate interlacing net-work of thoroughfares over the entire city and giving access for all domestic purposes to the rear of the lots or the "back yards," which, owing to the depth of the whole lot, are usually much larger than is necessary for any practical use, unless partly occupied by stables or other buildings, and which, owing to their location, are rarely made ornamental. Twenty feet of this unoccupied ground might most advantageously be disposed of in form of ornamental grass-plot at the front, setting the house that much farther back from the building-line and affording ample opportunity in the space so acquired for any architectural treatment whatever requiring projection beyond the wall-line. This is sometimes but not generally done. Usually the house is put quite up to the legal building-line, and privileges are purchasable from the city by law for such projections as bay-windows, steps, balconies, etc., at fixed rates for so many feet and inches. The result is that at some points the sidewalks are most inconveniently embarrassed. We infer from the style of building in Philadelphia that law and custom is the same as that which obtains here, while in Boston the street fronts are controlled by legal regulations analogous to those of New York, and at the same time the rear of the lots is approached by high-ways and by-ways, which, while they are usually much more dignified thoroughfares and in much better keeping than many of the alleys in Baltimore, seem to be afflicted with the somewhat monotonous uniformity of nomenclature, "Private way, dangerous passing," explained probably by an extreme aversion on the part of the modern Athenian Government to subjecting itself to liability for damages arising from any possible contingency involving danger of life and limb to any citizen.

Still one other condition has had an indirect influence upon the general aspect of recent building here: namely, the apparent doubt which arose in the public mind some score of years ago as to just in what direction the tide of wealth and fashion intended to flow for the future in building its homes, which resulted for some years in tentative incursions upon various lines and a lack of concentration at any one point. Up to that time the movement had been a perfectly legitimate and consistent progress in a north-westerly direction, and exactly the course, with little tendency to diversion, that was to have been expected from the natural development of the city, from the old days "over the bridge" to Battle-Monument Square, and finally to Mt. Vernon Place with Charles Street and its immediate neighborhood. But at that point there was a hesitancy, and other quarters suggested possibilities. Madison Avenue and Eutaw Place put in their claims as approaches to Druid-Hill Park, and even the distant Franklin and Lafayette Squares, a long mile or more away to the westward, had a word in the matter. Mt. Vernon Place began to look a little dingy and neglected, and the statue of Washington might almost have trembled, as, from the top of his tall marble shaft, he watched the invading army of boarding-houses fast closing around his social stronghold, heretofore held impregnable.

This state of things resulted in the best class of houses being for a long period quite scattered, and with the city's growth, no one street of special interest and local pride developed into a prominent and handsome avenue. A reaction of a few years ago, however, has now most effectually redeemed Mt. Vernon Place (of which more further on), and fashion has seemed to decree that, with the circle almost swept by the shadow of the Washington Monument as a nucleus, the streets spreading northerly from it should have the preference. While the broad Eutaw Place on the other hand, with the mile stretch of parks down its centre and its somewhat showy rows of houses, extending to the very gates of Druid Hill, is undoubtedly the most monumental avenue in the city, though really possessing no building of any special architectural merit.

It is quite obvious that three such positive conditions as these — the irredeemable ground-rent, the alleys between the city blocks and the undecided locality for the centre of fashion, must have a decided effect upon the general aspect of any city and distinguish it from others where the same conditions do not exist. Such is undoubtedly a fact in regard to Baltimore. The result is apparent, although the causes may not be so readily recognized by the eye of a stranger. As all misfortunes are made bearable by some mitigating benefits, so it is claimed by many that out of these very conditions accrue many advantages relating to domestic comfort and economy, but they are certainly not so visible upon the surface as the few but more conspicuous evils.



INAPPLICABILITY OF THE BUILDING LAWS TO EXISTING CONDITIONS.—EXHIBITIONS OF WATER-COLORS AND ETCHINGS. —THE ACCIDENT TO THE MIDLAND HOTEL AT KANSAS CITY, MO.

THE inefficiency and defectiveness of the present building ordinance has lately been the subject of much grumbling by all parties interested in building. The code as it now stands is applicable to a moderate-sized city of ten years ago, but is in no ways sufficient for the needs and requirements of a city where immense buildings are constantly being put up, and is especially lacking in ordinances relative to buildings whose construction and requirements were absolutely unknown a dozen years ago.

Some of the ordinances have been hastily amended without consultation with either architects or underwriters. Others have been allowed to quietly drop into disuse, so that, altogether, much more latitude is allowed than is at all times desirable, and it has even been hinted that in the past frequently undesirable construction has been "log-rolled" through the building-department. All these things have caused much growling, but no really serious and deep complaint. However, the recent annexation to the city of certain

neighboring suburbs and the near prospect of the addition of Hyde Park and others, has raised afresh the question of fire limits and so forced the subject to the front that new legislation is absolutely necessary in the very immediate future. With this question is being agitated anew the subject of the building ordinance.

After the awful experience of the great fire, the feelings of the Chicago people are naturally very strong on the subject of fire-limits, and up to the recent annexations mentioned, the fire limits were coincident with the city limits. But these additions to the city, each having its own building ordinances and fire limits, necessitate the rediscussion and probable revision of the fire limits. This time the subject, under the leadership of the Illinois Association of Architects, bids fair to be taken hold of in the right way and whatever is accomplished will undoubtedly be of value.

This Association, at one of their recent meetings, had the matter under consideration, and had invited to participate in the discussion the Board of Underwriters, the Real Estate Board, the Citizens' Association, and the Building Commissioner himself, thus taking in all the different elements that should properly be consulted upon such a question. There was a unanimous opinion that the ordinance should be revised, but here the unanimity ceased. It was argued that the city is now over twenty miles in extent and that there are thousands of acres yet a veritable prairie, which with a strict fire limit coincident with the city limits could not or would not be utilized for homes for many years. Thus the poorer classes would be obliged to crowd together in tenement-houses instead of having their own homes of cheap construction, and by this very fact bring upon the city greater perils than those of fire.

In the course of the discussion the fact was brought out by the President of the Board of Underwriters that many of the newly built, extremely-high and showy buildings are most dangerous fire-traps, and that no reputable company would take risks upon them. The excessive height of these buildings renders the fire department absolutely useless. Hence, the employment of the cheap construction of the ordinary building of four or five stories in a building of eight or nine stories causes it to become the veriest tinder-box instead of a barrier impassable by fire. There is quite a party in the City Council which desires to absolutely prohibit extremely high buildings, but it is to be hoped that this element will only be strong enough to prohibit buildings not absolutely fireproof from being over five or six stories high. By this means the most effective possible check will be offered to a large conflagration in the most densely built portion of the city.

As a result of this conference a committee from the architects. the underwriters and the real-estate men was appointed to work in conjunction with the Commissioner to draft a suitable ordinance, which shall be laid before the City Council. As it now appears, and is greatly to be hoped, there will probably be drafted a code which shall require for extremely high buildings an almost, if not absolutely, fireproof construction, and that within certain districts a strict fire limit will be drawn, but beyond that, with certain restrictions as to height, distance from other buildings, etc., wooden buildings will, at least for the present, be permitted. This would seem to be the reasonable solution, for, as one of the architects said, the city at present is "at once a metropolis, an aggregation of villages and a howling wilderness."

The Commissioner also had under consideration a special theatre, ordinance, relating particularly to the seating of the audience. Among other things, every programme shall have printed on it, of dimensions approved by the Building-Department, a plan of the house, showing all the exits, stairs, etc. This is rather a novel feature, but it would appear somewhat doubtful if this would really be of great benefit unless it were compulsory to have all the exits opened at the close of each entertainment, and not merely the principal ones, as is now the case. By this means the audience would almost be forced to use these exits, so that in case of panic they would instinctively do so.

There has recently closed at the Art Institute a most delightful and successful loan-exhibition of water-colors, which is intended as the inauguration of an annual exhibition of water-colors. The number and beauty of the pictures was a surprise to most people. In fact, one is constantly being pleasantly surprised at the rapidity with which art treasures are being collected here, and at the rapid and substantial progress that art is making. This exhibit consisted of something like two hundred and fifty numbers, and included some pieces from almost all the well-known modern water-colorists: but in the midst of all these great names, the local artists held a position of which they might well be proud.

There is now also on exhibition a series of original drawings by the masters, as also of etchings and engravings. This collection, made by the late George W. Reid, of London, keeper of the prints of the British Museum, is known as the Reid collection and comprises nearly three hundred and fifty numbers. To professional artists and to students of the history of art, it is an extremely interesting collection, but can scarcely be said to be particularly enjoyable to the mass of the people not intimately connected with art study. This collection has been lying here at the custom-house for some time, the owners not wishing to pay the heavy duty upon it unless sold. For an art-school, it is a collection that would certainly be very valuable, but as no one would think of buying it without seeing it, in order to get it before the public to see if it could not be bought and so remain in this country, the United States Government for once, at least, has shown a disposition to foster art in a mild kind of a way, and the Art Institute was made a bonded warehouse. Consequently, the collection is really being exhibited in bond; however, there does not as yet seem any great probability of its being secured for Chicago.

The investigation into the recent building accident at Kansas City has been followed by the profession here with more than usual concern, since the plans were drawn in this city and several of the contractors are also from Chicago.

The Midland Hotel was planned for one of the finest hotels in the West, and when completed will have cost in the neighborhood of a million of dollars. The construction is said to be absolutely fireproof, the floors being the usual iron I-beams and hollow-tile arches. The building was begun nearly two years ago, and was to be ready for occupancy the first of the coming May. The dining-room is located on the sixth floor, and the ceiling is about eighteen feet in the clear, seven feet above this is the flat roof. Originally, there was a row of columns down the centre of the dining-room, but after the building was well under way, it was decided to omit the columns and replace them by trusses, and because of this change the difficulty arose. On February 29 one of these trusses fell and with it dragged down another, bringing down about 50 x 60 feet of ceiling and heavy roof upon the sixth floor. This floor seems to have borne the tremendous jar very perfectly, for the greater part of the mass was stopped here and the floor seems to show no particular damage from the strain. However, some portions of the falling débris broke holes through the arches and went tearing down through the various floors, while one enormous mass plunged down a large staircase sweeping everything before it and crushing the iron stairs into the lower stories as if they had been paper. Marvellously enough of the seventy-five men working in the building, only one man was killed, although there were five more or less seriously injured. The one thus killed was a carpenter and his body was not found until the next day: when at last it was discovered, it was on the second floor at the bottom of the staircase mentioned. He had been carried down with the falling mass from the sixth floor to the second, but strange to say he showed but few signs of bruises or contusions, and, according to the report of the physicians, must have died of suffocation, none of his injuries being sufficient to cause death.

The inquest lasted five days, and an immense amount of testimony was taken. Besides the architects, supervising-architect and the various contractors, other architects and experts were called, so that all phases of the accident were more thoroughly examined than is usual in such a case. The verdict was a most sweeping one — rather unnecessarily so it would seem. The contractors for the brick and iron work each with their foremen, were delared, together with the local superintendent, grossly negligent, while the architects and the supervising-architect were censured in the following words: "We believe from the evidence that the falling of said part of the building was not due to or caused by defects in the revised plans or drawings therefor; but the architects, Messrs. Burnham & Root, were neglectful in that they did not also revise the specifications in such manner as to insure an improvement in the quality of the brick construction in the sixth and seventh stories supporting the two easterly trusses.

"That we believe from the evidence as to Walter C. Root, the general superintendent of construction, that by reason of the large amount of work under his charge, which besides the hotel included the Exchange Building and the American Bank Building, and that he had given special orders for the proper execution of the work in question, and which orders were disregarded; therefore, it is of our opinion that he should not be held responsible for the failure of said part of the building; but that we censure him for not having made a personal examination of the setting of the plates and trusses thereon."

As a result of this verdict the Grand Jury two days later indicted for manslaughter in the fourth degree, the supervising-architect, the superintendent of construction, the foreman of the iron contractors and the foreman of the mason contractors. At first this jury reported that they could find no bills against any one connected with the disaster, but the judge refused to receive this report, saying, "There was culpability in the Midland disaster. I do not consider that we can attribute the accident to Providence. It was surely the result of the acts of the man." Accordingly an hour later they found the above indictments.

In the investigation it was clearly proved that the disaster was caused by the falling of the trusses, consequently the attention was turned to them and the piers by which they were supported. Had some member of the trusses given away there would at once have been a heavy thrust and the wall would have been pushed outward, but this was not the case as most of the brick fell inward. Moreover, careful refiguring of these trusses showed that the calculations were entirely correct, a fact substantiated by several experts. Hence, attention was then directed to the plates that distributed the weight of the trusses upon the piers, and to the piers themselves.

At once great differences were found between the work in place and that called for. As for the plates, one that should have been $3\frac{7}{16}$ feet square and $2\frac{1}{4}$ inches thick, was replaced by one $1\frac{3}{4}$ feet square and $1\frac{1}{2}$ inches thick. The matter of thickness was probably not of very serious moment; but the amount of surface (less than one-half) intended to distribute the load over the piers was of the gravest importance. But, as if this were not bad enough, the piers were in their way equally as defective. The revised drawing show-

ing a pier four inches thicker than originally drawn seems to have been ignored; at any rate, a wall of 17 inches was built instead of one of 21 inches. This was still further weakened by an unfortunate 9′ x 13′ flue, and the whole was made as weak as could be by sprinkling in many of the poorest, softest bricks it is possible to imagine.

So poor indeed were some of these bricks that in experiments made they crushed at a little over 500 pounds per square inch. All these circumstances being combined, it is only a marvel that the accident did not occur before, and the excuse of some of the contractors that the revised drawings did not have strict enough specifications, seems very, very weak. According to the evidence, the supervision of the work by the clerk-of-the-works (or superintendent of the works as he seems to be called) and the various foremen seem to have been most shockingly and grossly careless. A supervising architect with three immense buildings, not to mention smaller work, upon his hands, would not be expected to, and certainly could not even if he wished, examine in detail the size of every pier and iron plate, but the clerk-of-the-works and the foremen of the various trades certainly can have but slender excuse for not having kept themselves thoroughly posted on these points, especially when they were aware the drawings had been revised and that they would have to look out for changes.

The owners now announce in the daily papers that they shall have three of the best experts examine the building in every part and make sure it has not been injured by the accident; and after the building is finished, they will have another set of experts go through it so as to be certain that it is absolutely safe. As regards the money damage the estimates vary from $20,000 to $50,000, with a strong probability in favor of the latter. It is said that the contractors who were blamed in the verdict have agreed to make good all losses. If this proves to be the case and there are no suits at law before the affair is finished, it will certainly be very exceptional and the owners may congratulate themselves as being unusually fortuate, if they lose nothing more than the income from the building for two or three months.

BOSTON.

THE NEW ATHLETIC-CLUB BUILDING. — SOME THOUGHTS ON CONSTRUCTIVE EXPRESSION SUGGESTED BY ITS DESIGN. — INDICATION OF A SURVIVING INTEREST IN GOTHIC DETAIL.

THE Athletic-Club building has reached a point where it is possible to form some idea of its façades, though not of its roof lines — and there is a great deal to commend in these façades and some few things to question. This questioning must be based so much upon general character of design and not upon special characteristics, that it will require some preamble before the questions can be intelligently applied to this individual example. Architecture, in its practice, covers a scope that extends from purely utilitarian construction on one hand to pure decoration upon the other, and each architect approaches his work at some point within this scope. There is constant shifting of this point of attack, and, though upon reflection, it is evident that there is a regular and steady progression of attitudes from the work of the engineer to that of the decorator — as with the colors in a spectrum. Yet, as in the spectrum, we are prone to divide colors into the two divisions of cold and warm, so, according to our temperaments, we are apt to join one or the other of the two camps of those who insist upon architectural design declaring each fact of construction and purpose, or of those who consider constructive expression as secondary to æsthetic pleasure. That allegiance to either of these camps is temperamental can hardly be gainsaid, a tendency toward either extreme deprives us in an increasing ratio of the pleasure to be obtained from the other, and as is usual in such cases we are much more apt to find the most satisfactory attitude to be a mean between the two, where construction and expression are frank and simple, and decoration is used to accentuate. But in applying this system of equilibrium to the practice of architecture, is there not a tendency to abnormally magnify some of the factors when we are obtaining the greatest common divisor — especially the factor of the relative value of expressed construction? Construction except when manifestly masterful does not excite the interest that decoration does. A masterpiece of engineering as freely obtains admiration as a masterpiece of artistic skill — but the constructive expression of an architectural façade is a very simple matter, and by no means gives the relative return of satisfaction that proportions and decoration do.

By this constructive expression is meant not only compliance with the ordinary laws of construction, which no sane man wishes to do without, but also compliance to that other demand of the purists, that the interior should be expressed by the exterior; that a large and small room next to each other should not have the same sized windows; that a staircase should have windows stepped upon the outside to "express it," etc.

Not that there is no element of reason in this demand, but that the application should be to masses of building on different planes, not to the perforations of one mass in one plane.

Now, to the case in point. The south façade of the Athletic Club on the second story, the large windows showing the large room within, have their motives carried around and between these bays, so that the second story is symmetrical from the corner until a point beyond the second story where the character of window changes.

On Exeter Street, two of these large second-story windows are carried around the corner, while beyond there are five windows in three stories arranged like a five-spot of cards. Undoubtedly, the change in these windows express the stories within, and the central window of the five-spot denotes a staircase or a mezzanine; but the satisfaction that one feels at having the internal anatomy of the building thrust at him in this manner by no means compensates for the loss of dignity in the façades, and for the restlessness of these windows of many levels. The very first quality of good architecture is inertia, and the quickest method of destroying it is to produce the diagonal lines which successive staircase windows give. Even the staircase at Blois and Torre Minelli in Venice, are comparatively unsatisfactory from their restlessness.

Another of the virtues in an architectural design is the dominance and reiteration of one factor, either of a horizontal or a perpendicular line, preferably a horizontal one. It is this that give colonades, arcades, cloisters their value. The same thing applies to window-openings. All this sounds dogmatic and pedantic, but it is true, and can only be ignored where windows are small in proportion to the wall they are in, as in the Ducal Palace in Venice.

In this case of the Athletic Club, it seems a question whether it would not make a much more dignified simple whole of the building, to carry the motive of the large window throughout the façades — dividing it by the floor where necessary, but keeping this division as a transom of greater or less width — subordinated to the scale of the whole opening.

Apart from this, which is purely a matter of different ways of looking at things, the Athletic-Club building is simple, and obtains variety of surface and color by simple means. The use of moulded-brick jambs and quoins, set in white mortar, as contrast to the Eastern brick set in red mortar, and the diaper-work in the upper story show an appreciation of methods that it is pleasant to see. The proportions of the arches and cusps are excellent — the mouldings are good.

It is a question whether a cusp ought to be applied as a mere decoration upon a solid tympanum, or should not rather enrich an opening. But apart from this the building is a good, straightforward building, depending for its character on simple refined work, and that is no small praise amongst a lot of specious of vulgarities.

It is interesting to notice a suggestion of Gothic detail in several buildings that have been erected recently. The Hemenway Building had a touch of it, and in the new building at the corner of Winter Street it is unmistakable. It belongs to a late type, smacks a little of Tudor work, and of the many buildings with square-headed windows and parapets in Oxford, Shrewsbury and Warwick. The heavy label turning down at each end and becoming a string-course or terminated in corbels is a favorite feature, and with all due respect to it is stupid enough.

The doorway has a heavy meaningless canopy, and altogether there is too heavy a hand in the details, yet this building is a marked improvement over many of its class, simply because it is unpretentious.

THE ILLUSTRATIONS.

[*Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.*]

DOORWAY ON COMMONWEALTH AVE., BOSTON, MASS. MESSRS. MCKIM, MEAD & WHITE, ARCHITECTS, NEW YORK, N. Y.

[Helio-chrome.]

GOTHIC SPIRES AND TOWERS. PLATES 7, 8 AND 9. — ST. MARY MAGDALENE, TAUNTON; ST. MARY'S, BLOXHAM; ST. OSWALD'S, ASHBOURNE; ALL SAINTS, LEIGHTON BUZZARD; ST. HELEN'S, BROUGHTON; THE CATHEDRAL, NORWICH; AND ST. VINCENT'S, CAYTHORPE.

[Issued only with the Imperial Edition.]

HOUSE FOR EX-GOV. JNO. M. HAMILTON, KENWOOD, CHICAGO, ILL. MR. S. M. RANDOLPH, ARCHITECT, CHICAGO, ILL.

THIS house which will be finished about May 1st, is situated at the corner of Madison Avenue, and Park Court, Kenwood. The construction is of rock-faced Bedford stone up to line of main floor, Anderson pressed brick to line of second floor, and the remainder is of frame work with outer enclosure of California redwood shingles. Modern improvements are provided, and thorough heating and ventilation secured; the cost will be $10,000.

HOUSE AT WASHINGTON, D. C. MR. ROBERT STEAD, ARCHITECT, WASHINGTON, D. C.

CHURCH OF GUADALUPE, MEXICO.

HOUSE FOR MRS. J. D. CAMERON, WASHINGTON, D. C. MESSRS. HORNBLOWER & MARSHALL, ARCHITECTS, WASHINGTON, D. C.

STUDY FOR A SUBURBAN HOUSE. MR. A. J. NORTON, ARCHITECT, UTICA, N. Y.

HOUSE AT CHICAGO, ILL. MR. J. K. TAYLOR, ARCHITECT, ST. PAUL, MINN.

HOUSE FOR JAMES McKAY, ESQ., SHADY SIDE, PITTSBURGH, PA. MR. W. S. FRASER, ARCHITECT, PITTSBURGH, PA.

PHILADELPHIA

THE ARCHITECTURAL PORTION OF THE ANNUAL EXHIBITION OF THE ACADEMY OF THE FINE ARTS.—SOME DRAWINGS BY RUSKIN.—MOVEMENT TO MAKE AN OPEN SQUARE ABOUT THE CITY-HALL.

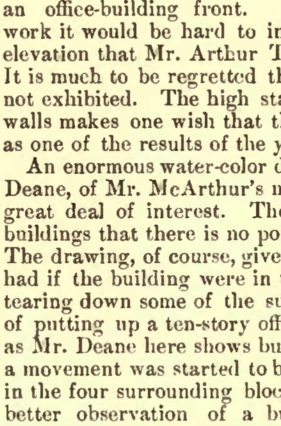
THE directors of the Pennsylvania Academy of the Fine Arts encouraged by the general interest shown in the architectural room last year, renewed their invitation to the architects by asking that a joint committee be appointed from the Philadelphia Chapter A. I. A. and the T-square Club to arrange another such room in the present exhibition. To most large exhibitions of paintings any collection of architectural designs that may be appended is usually looked upon by the general public as a side-show, and the only spectators to be found in its desolate rooms are pretty sure to be people who have a particular interest in matters relating to the profession. It is all the more gratifying therefore to note what a large proportion of the visitors to this fifty-eighth annual exhibition of the Academy linger in the architectural room. Many of them pay no attention to the perspective or decorative studies that make what is generally thought the more attractive side of an architect's work but spend all their time in examining plans,—for almost everybody even if he has never entertained the least notion of building has amused himself at one time or another in making a mental picture of the house that he considers properly arranged for his individual use, and it interests him to see how some other man has worked out the problem. Although he would not care to acknowledge it he may be bored by looking at pictures and slips with relief into the room where the plans are, that he may find something he is sure he can appreciate—something ingenious, something practical and above all something personal. One scarcely knows whether to be the more rejoiced for the cause of architecture at the sight of such a goodly number of visitors or despondent rather for the sake of art that the greater part of them should be counting the steps in the plan of a seashore cottage and have their backs turned toward the glowing color studies of Mr. LaFarge.

For men interested in decoration these twenty-four studies are full of help and suggestion. No description of them, however, is necessary here as they have already been shown—with a good deal more of the most interesting work in this exhibition—at the Exhibition of the Architectural League in New York. In this list are Mr. Hunt's studies for the Pavillon du Louvre (made while he was employed on the *Traveaux du Louvre*) and his admirably colored *projet d' Ecole* of an Algerian station. His full-size detail of a baluster, by the way, gives a hint that might be well taken in regard to architectural exhibitions in general, and that is to show more full-size details. An architect's sketches and perspectives, no matter how attractively rendered, must necessarily suffer by comparison with water-colors pure and simple, and a collection of half-mechanical drawings that try hard to be pictures is likely to leave on the Philistine mind a vague impression that they would have been much better done by a regular artist. In this way the public, forgetting that these sketches are but the avowedly imperfect representation on a small scale of something, it is to be hoped, much more imposing, is apt to make unflattering comparisons between these tentative studies and the pictures in the next room that are, so to speak, their own accomplished results. Many people have no idea how many drawings must be made before a house of any importance is finished and would be sure to give more credit where credit is due, for much of the detail that is supposed to be the artisan's own creation, if they could see exhibited a few of the full-size detail drawings for furniture, color-decoration, wood and stone carving and the like that even the client never knows of.

Among the drawings already shown in New York are four by John Ruskin. A delightful one is the sketch of an old Hall, done on dark paper with water-color and Chinese white. Strength and delicacy are attributes that are seldom found together in this manner of sketching architectural subjects but here we have them both to perfection—consistency with the critic's own precepts in the art of drawing, it is true, we shall have a harder search for. Two of the pencil sketches of Gothic tracery with no detail in the shadows, which are thrown in with a wash of monochrome are so "professional" in their handling as to be a revelation to many artists who knew nothing of his work and were in the careless habit of speaking of him as of one who could not draw himself and whose criticisms were therefore of little consequence. Mr. Charles C. Moore, of Cambridge, sends two exquisitely rendered wash-drawings of details from Lincoln Cathedral and from Nôtre Dame at Paris. They are for reproduction in a book that he is preparing on Pointed Architecture. Some more good drawings from Boston are a capital water-color of the interior of an Italian church by Mr. R. Clipston Sturgis, two more not quite so good of out-of-door views and some rapid European pencil sketches that deserve great credit for the honest way in which they indicate, as far as may be, the material and the general tone of the buildings drawn, without the least mannerism or attempt to make a pretty picture. Mr. Wilson Eyre, Jr., shows some original and picturesque city fronts and a sheet of designs for mantels for his new University-Club building. It is a pity that he does not exhibit any of his country work this year as he is apt to be more successful in this branch than in his street architecture. From Messrs. Furness, Evans & Co., there are four large drawings in India-ink—pen and brush work combined. One of the most interesting of these is a bird's-eye view of an arrangement of hospital buildings. Messrs. Cope & Stewardson show several sketches, mostly of country houses, and some variously rendered studies of interior work. Accompanying one of these—a design for a mantel—is a photograph of the wrought-iron fire-dogs that are indicated in the sketch. There is nothing particularly original about their design, but the photograph plainly shows that their workmanship is so good as to make one almost wish to retract what was written above about the credit due to architects for their full-size drawings and to give all the glory to the artisan. Surely the art of working in iron although at a low ebb for a long time is not lost. Much of the newest Italian work is very little behind the best of the old. Berlin executes better and better pieces of wrought-iron each year and our own country has lately produced specimens of elaborate and difficult forging such as a few years ago would have been reckoned among the things that men had once done but that would never be attempted again for want of encouragement in an age that fostered no art that was not strictly utilitarian.

Mr. Frank Miles Day, has some clean pencil sketches of Italy and Germany, and Messrs. Moses and King, exhibit seven frames of designs for cottages and the like, of which the most attractive are rendered in the fewest colors. There are only six T-square Club drawings shown. Four of these are from the same competition—an office-building front. As a specimen of clean pen-and-ink work it would be hard to imagine anything more perfect than the elevation that Mr. Arthur Truscott has sent in for the competition. It is much to be regretted that more of the T-square Club's work is not exhibited. The high standard of the half-dozen designs on the walls makes one wish that the members had made a fuller showing as one of the results of the year's work.

An enormous water-color drawing, done years ago, by Mr. E. Eldon Deane, of Mr. McArthur's new City-Hall is just now the centre of a great deal of interest. The actual structure is so hemmed in by buildings that there is no point from which it can be seen as a whole. The drawing, of course, gives an unobstructed view such as might be had if the building were in the middle of a large public square. In tearing down some of the surrounding houses lately for the purpose of putting up a ten-story office-building on the site, just such a view as Mr. Deane here shows burst upon an astonished public. At once a movement was started to buy and tear down all but a few buildings in the four surrounding blocks and to leave the space open for the better observation of a building whose "imposing beauty," the daily papers tells us, "is absolutely without a parallel in this country." The assessed value of the property required is somewhat over seven million dollars. A breathing-space in the centre of the city is indeed sorely needed, but seven million improvement of the property seems to some chronic grumblers a high price to pay so long as the streets remain ill-paved and dirty for lack of funds to repair them. The originators of the plan reply that a view of "the splendor and surpassing beauty of the city's grand structure" (to quote again from the papers) is worth paying anything for. Whichever party wins it is surely a cause for congratulations that the mass of the people are taking an active, if enforced, interest in architecture and that a general discussion should have been provoked in which by no means the least prominent factor is the merit or the shortcoming of an architectural design.



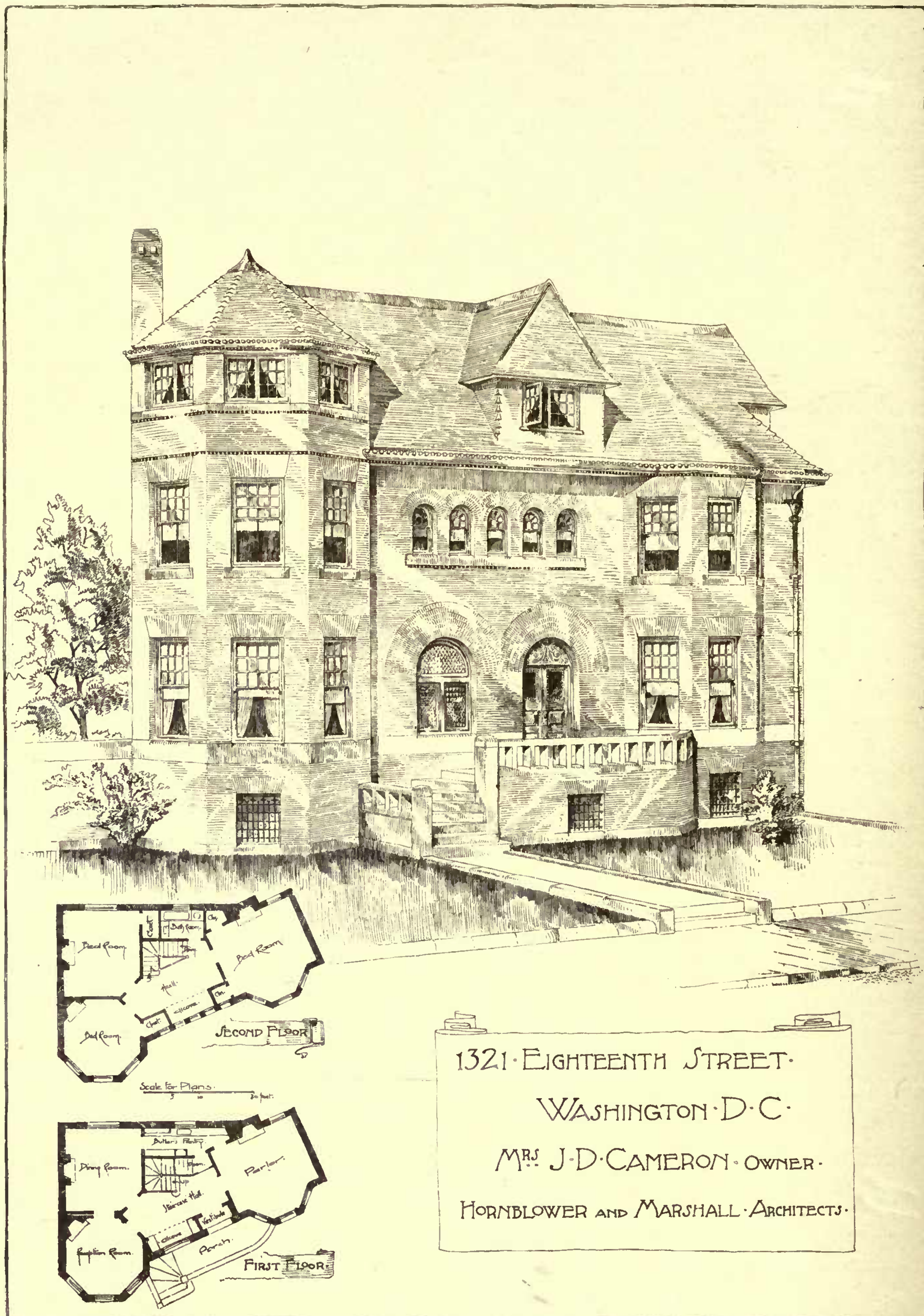
CINCINNATI

THE READY-MADE ARCHITECTURE OF THE BUILDING PLAN ASSOCIATIONS.

THIS city like most other large cities of the country is afflicted by the ready-made plans that emanate from the factories where such things are turned out. It is at these places that "misfit" architecture is doled out at about one-fourth the regular prices. It is by these wholesale ways that inno-

No. 639 American Architect and Building News, Mar. 24 1888

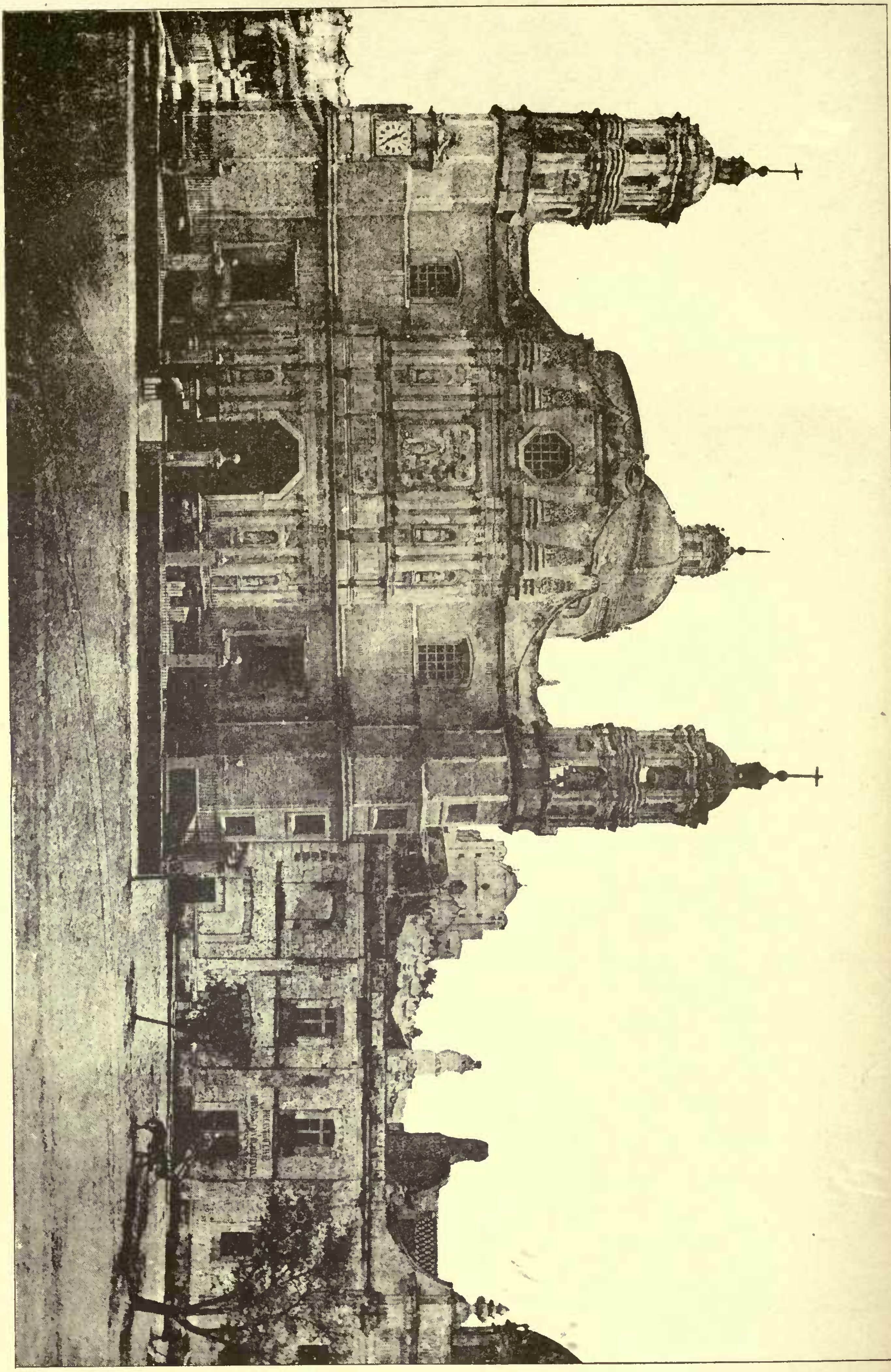
COPYRIGHT 1888 BY TICKNOR & Co



1321 · Eighteenth Street ·
Washington · D · C ·
Mrs J · D · Cameron · Owner ·
Hornblower and Marshall · Architects ·

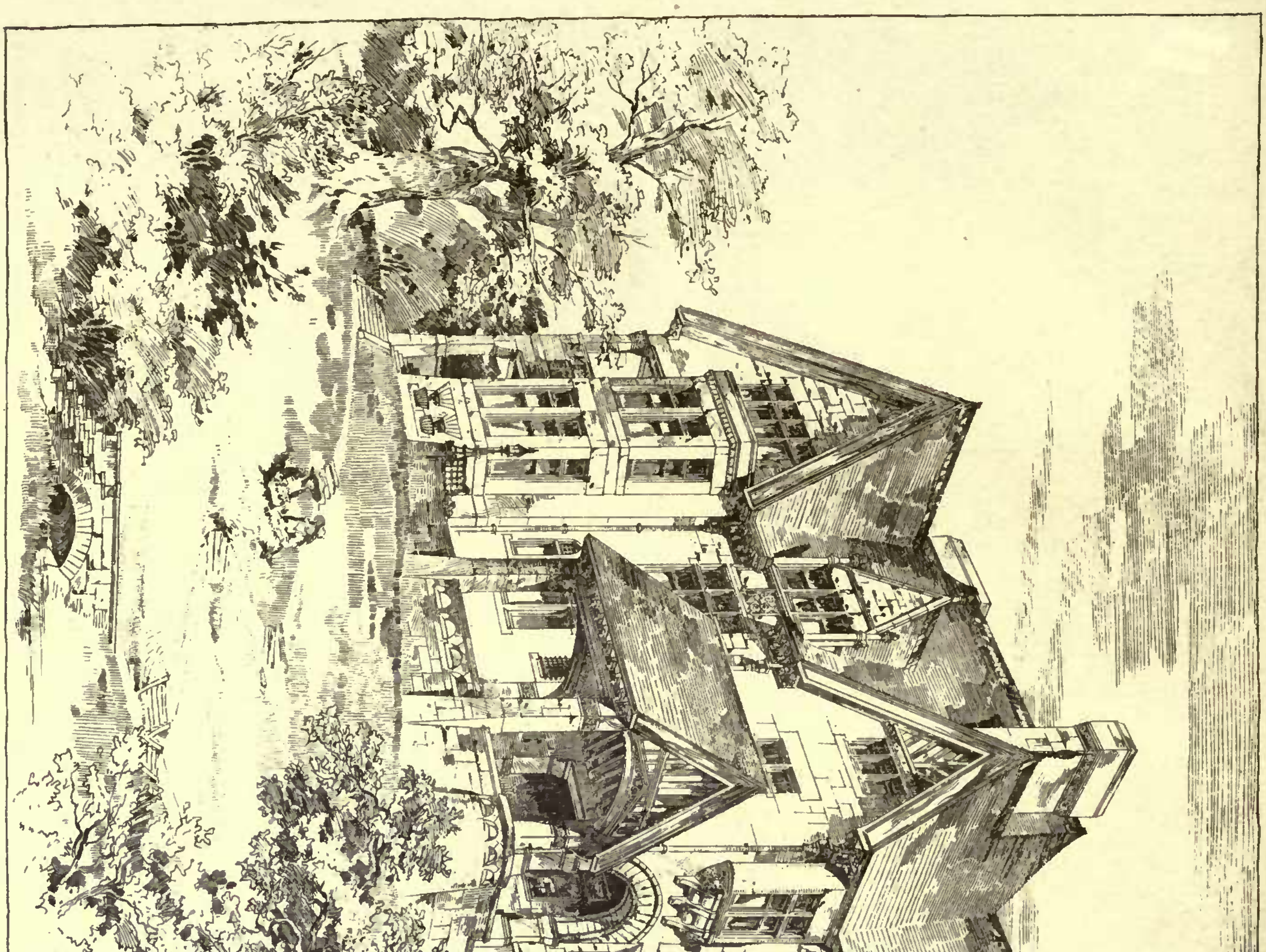
Heliotype Printing Co. Boston.

COPYRIGHT 1888 BY TICKNOR & Co



Church of Guadaloupe, City of Mexico.

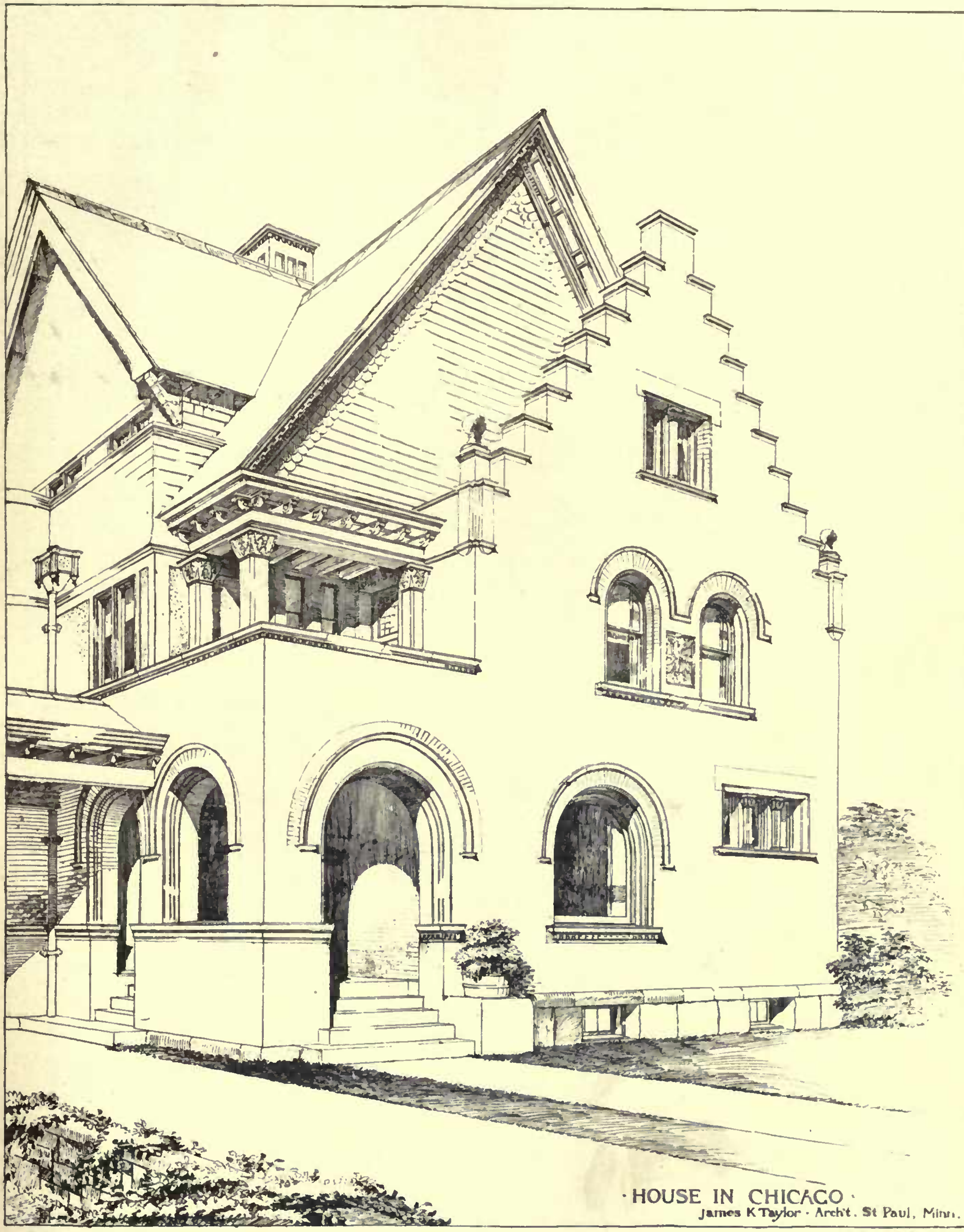
COPYRIGHT 1888 BY TICKNOR & CO



HOUSE · FOR · JAMES · McKAY · ESQ.
SHADY-SIDE · PITTSBURGH · PA.
W. S. FRASER ARCH'T.

Heliotype Printing Co. Boston.

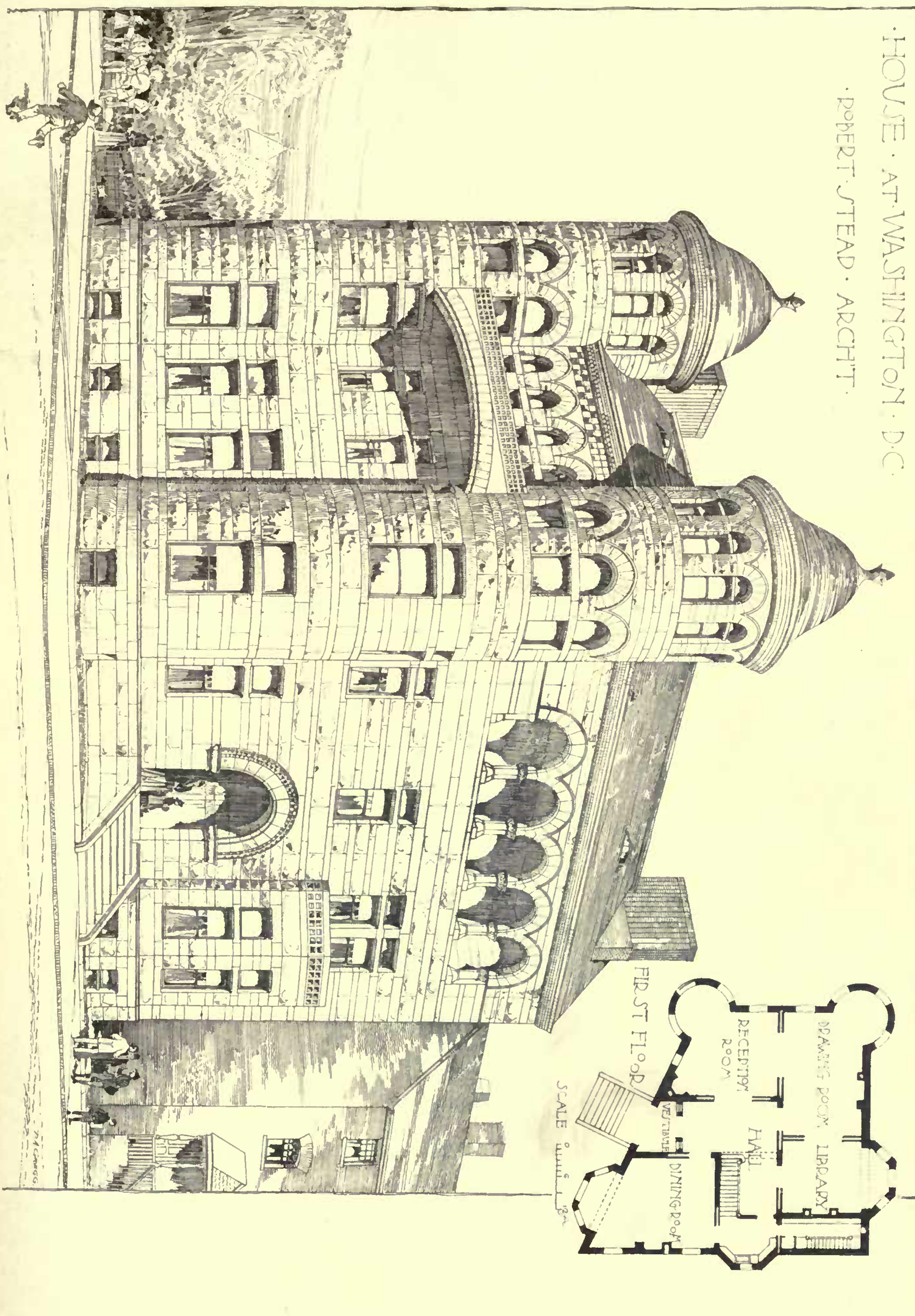
Copyright 1888 by Ticknor & Co



· HOUSE IN CHICAGO ·
James K Taylor · Arch't. St Paul, Minn.

Heliotype Printing Co Boston.

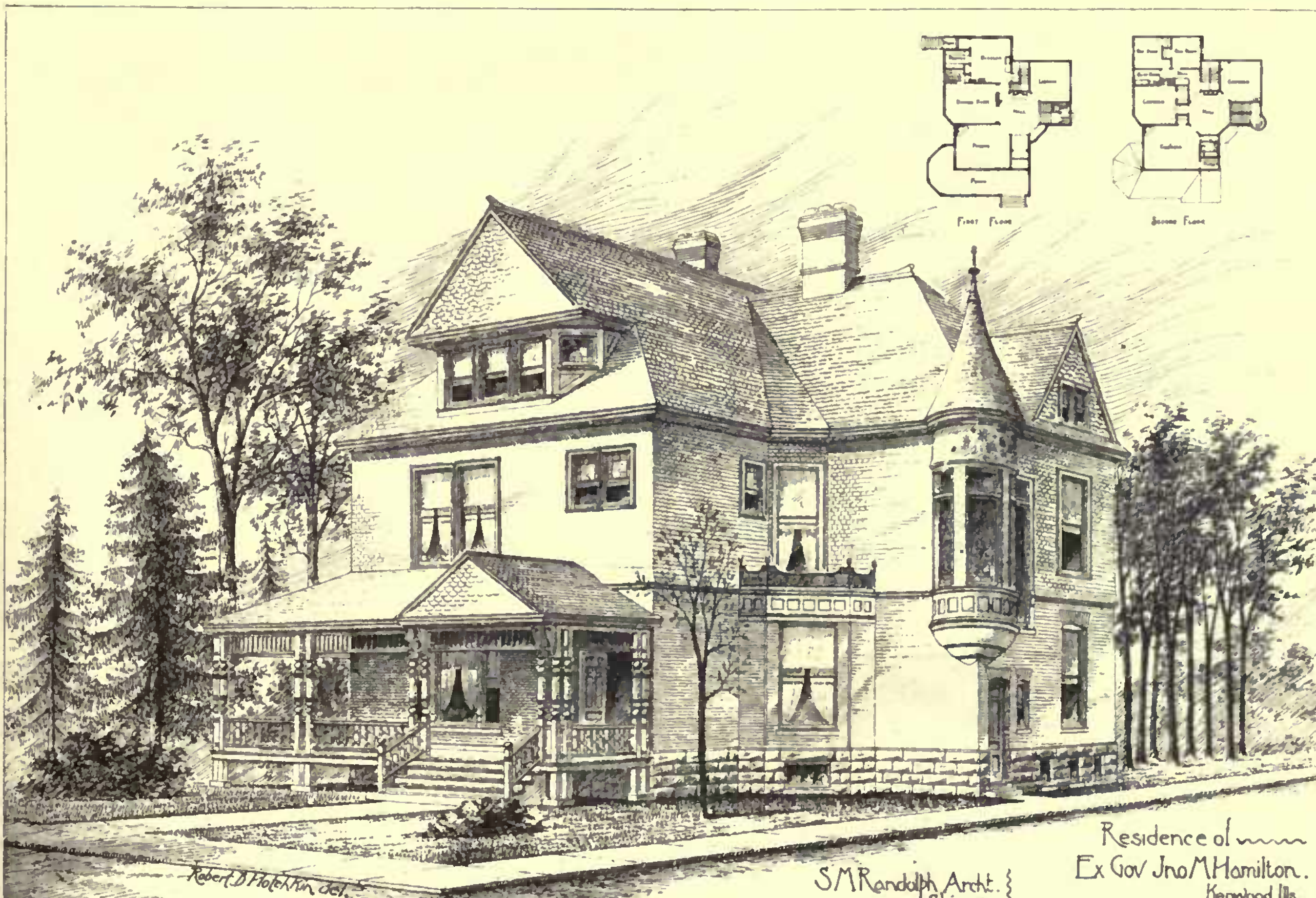
COPYRIGHT 1888 BY TICKNOR & Co



Heliotype Printing Co. Boston.

COPYRIGHT 1888 BY TICKNOR & CO

·STUDY FOR A SUBURBAN HOUSE·
·ALBERT J NORTON· UTICA·N·Y· 1888·



S M Randolph Archt. Chicago.

Residence of Ex Gov Jno M Hamilton. Kenwood Ills.

Heliotype Printing Co. Boston

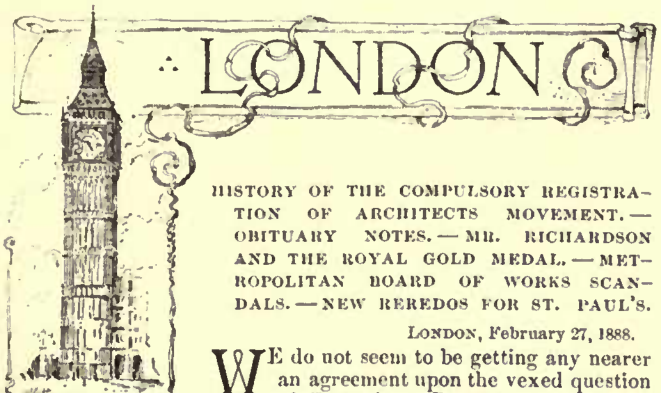
cent purchasers are allured by flaming advertisements into purchasing these plans, instead of going to the office of a regular practitioner. The innocent purchaser is assured that he will get double the amount of goods for his money, that he will get full plans, specifications and details sufficient to build his house, full and complete, and perfect, and clean, and the said purchaser in the innocence of his heart, perhaps not knowing the frailty of human nature in general and of the machine-made misfit plan-makers in particular, sends good cash to a bad cause, and by return mail, C.O.D., his trials and troubles begin.

To the purchaser the drawings are sufficient for all purposes, so he is assured, and he will not know until the bill of extras come in that there were many and grievous sins of omission and commission in the make of his gorgeous plans. He won't know until his pet house cracks all to pieces that there is a window eight feet wide in a circular bay that has a radius of five feet on the plan, with no means of holding up a heavy stone wall except one insufficient brick-arch and a good deal of faith. He will never know until he moves into the house that the sliding-doors have no pockets (that is if they are built as per plans), and that all the doors clash and bang each other about as though eternal enmity and war had been declared between them. When the furniture begins to claim its floor and wall space there will be renewed war; the bed will look around in vain for a place to rest its weary head, and while its foot keeps the occupants of the room from enjoying the fireplace, its head will shut out the light that is struggling to get in at an insufficient window; and so on for numberless items of bad and intolerable construction and planning. There seems to be nothing spacious or liberal about the house except the halls — as whatever space there was left over was turned into halls either upstairs or down.

If the alleged designer had any trouble with any space, he quickly solved the question by throwing it into the halls; and yet, notwithstanding such prodigal liberality as to halls, they cry out in their misshapen, untimely birth against their twists and turns and contortions, and the carpets that are intended to cover them want to know why they were ever made to be cut and slashed in such an unseemly manner.

The foregoing are only a few of the thousand and one things that go to make up a first-class set of misfit plans, and this is no imaginary thing, but is an everyday occurrence, as just such a set passed under the eye of your correspondent, and are now being redrawn so as form a correct basis of an understanding between the owner and builder, and so as to give the owner also some rights in his own house.

Some method ought to be at once instituted to warn the unsuspecting public that when they buy a set of these ill-considered, badly-planned and worse-constructed "misfits," they are laying up for themselves untold trouble both here and hereafter.



HISTORY OF THE COMPULSORY REGISTRATION OF ARCHITECTS MOVEMENT. — OBITUARY NOTES. — MR. RICHARDSON AND THE ROYAL GOLD MEDAL. — METROPOLITAN BOARD OF WORKS SCANDALS. — NEW REREDOS FOR ST. PAUL'S.

London, February 27, 1888.

WE do not seem to be getting any nearer an agreement upon the vexed question of Compulsory Registration of Architects, and this is the more to be regretted because I believe there are very few who at heart disapprove of registration, in the abstract.

As this question is likely to become *the* question of the day, it may be as well to give a brief sketch of the history of the movement and explain, in a few words, how the present state of affairs has been brought about.

As most of us know the Royal Institute of British Architects is the real and recognized head of the architectural profession in Great Britain and until quite recently its authority has never been disputed.

But the Institute, relying on its brilliant traditions and apparently unchallenged authority, relapsed into a state of semi-somnolence and treated any propositions of reform with a slightly arrogant spirit, the whole tenor of its policy was of an ultra-conservative nature, and, in short, it refused to recognize the fact that the world was moving on, and that it must move with it. This unfortunate policy produced its inevitable result, and soon movements in the direction of reform became apparent both within and without the Institute walls. The internal movement does not directly concern us now: suffice it to say that after a considerable lapse of time, it was, in a degree, successful. The external movement took the form of a new architectural society which was founded on a liberal I might, almost say radical basis, and it was hoped that those eminent members of the profession, who had hitherto held aloof from the Institute would join this new "Society of Architects," and thus give it a professional *status* approaching that of the Institute itself. This hope was not realized. Although a few of the leaders of the society such as Mr. Ellison, of Liverpool, and Mr. Gough, whose earnest advocacy of registration has aroused the admiration even of his opponents, and some others are well-known architects; yet, the great majority of the members are of a very heterogenous character. One thing that was particularly noticed was the avidity with which the members of this new society affixed the letters M. S. A. to their names, from which many people drew some rather uncharitable conclusions.

In its early days this society mainly confined itself to matters of professional interest, and gave practical proof of its vitality by instituting periodical visits to the provinces, inaugurating exhibitions and the like. This useful action removed, in some degree, the unpleasant impression which the formation of a new society had made, and it was hoped that the society in its own province might be able to accomplish valuable work that could not very well be undertaken by the Institute. All this while, however, the Society was not recognized or noticed either by the Institute or by some of the professional journals — notably the *Builder*.

But it was not long before the Society's policy assumed a more aggressive character. Questions of professional policy were discussed, and a movement was eventually inaugurated in favor of the "federation" of all existing metropolitan and provincial societies into one national association. Soon, however, there were signs of a new and more important agitation in favor of the compulsory registration of every architect in the kingdom, and before this the minor subject of "federation" paled and eventually disappeared. "Architects must be recognized by the law" became the text for numerous professional sermons, and this movement originally started by a "small clique," assumed its present proportions. The Bill now before Parliament was drawn up by a Registration Committee composed principally of members of this Society of Architects, and the Architects', Engineers' and Surveyors' Registration Act, 1888, having passed its first reading (a mere formality) in the House of Commons, is now down for the second reading. This, if passed, signifies that the House has approved of the general principles of the measure. Whether the bill pass this ordeal remains to be seen.

Considering that the three chartered institutions of the respective professions, viz., the Royal Institute of British Architects, the Institution of Civil Engineers and the Surveyors' Institution will vigorously oppose it, I should say that its chances are small.

As I have previously stated, the broad, general principles of Registration are approved of, though not actually admitted, by the great majority of the profession. But that a bill of such a vital character should become a law without all its details having been most carefully considered and discussed by the profession as a whole does not appear to be possible, and I have no hesitation in saying that an incalculable injury will be done to the architectural profession in England if this bill pass in its present form.

En passant, I may mention that the interesting article which appeared last month in your columns upon this subject has attracted a considerable amount of attention in this country, the *Building News* having reprinted it in full under the heading, "What they think about the Registration Bill in America," and the *Builder* also having prominently referred to it. Unfortunately, this important professional question has occupied so much of my space that I shall only be able to refer briefly to the other events of interest which have taken place since my last letter.

The exhibition of drawings, etc., submitted in competition for the Institute's prizes, was remarkably good and of no small size. There was a most delightful collection of color-sketches from North Italy by Mr. Gerald Horsley, and the numerous pencil drawings submitted in competition for the Pugin Studentship were simply charming. The subject of the Soane Medallion was a gentleman's country house, and although the drawings were numerous, yet there were few that professed any particular merit. The design that won the prize was certainly original to say the least.

Talking of the Institute I am reminded that since I last wrote you our President has passed away. Ever genial and kindly, Mr. I'Anson's familiar form will be sadly missed by those who knew him. Another eminent architect has also left us — Mr. Godwin, who for so many years guided and controlled the fortunes of the *Builder*. Few of us know what constant care and anxiety the successful conduct of a newspaper entails, but the pre-eminent position which the *Builder* now holds in England is to a large extent due to Mr. Godwin. Two great men have passed away, men that England can ill afford to lose.

This year, for the first time, the R. I. B. A. determined to ask the Queen to present the Royal Gold Medal (which is given annually to some architect of particular eminence) to an American architect, and Mr. Richardson was selected. Unhappily, the intentions of the Institute were frustrated by the Angel of Death, and the Council publicly expressed its sincere regret the other night at this most unfortunate event. A very general hope has been expressed that some arrangements may be made for the illustration of Mr. Richardson's principal works in the *Institute Journal* or the professional papers.

The many rumors that have been floating about London with respect to the action of members of the Metropolitan Board of

Works are about to be thoroughly investigated by a Royal Commission which has been appointed by Parliament to "inquire into and report upon the working of the Metropolitan Board of Works and into the irregularities which are alleged to have taken place in connection therewith." Lord Randolph Churchill, in the speech in which he asked for the appointment of this Royal Commission stated that "it was alleged that members and officers of the Board had been interested in syndicates or companies formed for the purpose of speculating in property required for public use, and had gained advantages by buying or leasing property from the Board through privileged channels; that architects, members of the Board, sat in judgment upon applications for building sites, being at the same time in the paid services of the applicants; that a member of the Board was the architect for the Pavilion Music-hall, but was only nominal architect, there being associated with him a private architect who did the work and divided the fees; that a member of the Board was the architect of the Grand Hotel and of a large portion of Queen Victoria Street buildings, all erected on property of the Board; also, that members of the Board engaged outside in professional duties used their personal influence inside the Board in favor of schemes submitted to the Board in which they were professionally concerned." These are serious statements, and it is now quite time that the character of this important body is cleared.

The new reredos at St. Paul's Cathedral which has been some two years in building was unveiled on St. Paul's Day. This new altar-piece is sixty-seven feet in height and is constructed in variously colored marbles. The central and most prominent feature of the reredos is a life-sized figure of our Lord on the cross, flanked on either side by the Virgin Mary and St. John. The cost of this work has been nearly £30,000, and neither pains nor expense have been spared to render it a worthy ornament to our Metropolitan Cathedral. The architects were Messrs. Bodley & Garner.

The recent theatre-fires are bearing good fruit. At Exeter, the new theatre is to be constructed after Mr. Henry Irving's idea of a "Safety Theatre." This will be a curious experiment. The R. I. B. A., too, have been devoting a considerable amount of attention to the subject, and at recent meetings various ideas and suggestions for fireproof theatres have been considered and discussed. The Metropolitan Board of Works are introducing a bill into Parliament asking for further powers of inspection, but in view of the recent Hebb scandals, the theatre managers are petitioning for the power to be placed in the hands of a Government official.

A very interesting lecture on Mahometan Architecture was given at the Architectural Association the other night by Mr. Phené Spiers, who charmed us by a large collection of his most delightful water-color sketches. The fantastic beauty of these Moorish domes and minarets, backed by the deep ultramarine hue of the cloudless Eastern sky, formed a contrast that Mr. Spiers was not slow to take advantage of. Mr. Spiers was telling me of some of his adventures while with the worshippers of the Prophet. On one occasion he had to pay the keeper of a mosque ten francs a day to be allowed to sketch in the mosque, and while working was surrounded by four soldiers keeping guard over him, and each of these drew two francs a day out of Mr. Spiers's pocket. Rather an expensive task. But the drawing showed that it was quite worth it.

The Architectural Association has just started publishing a concise architectural idea of all the ancient buildings in the kingdom. The information is obtained from architects of eminence living in the district who personally guarantee the accuracy of the information they furnish. This idea will, I need scarcely say, form an invaluable addition to the architect's book-shelf. Really, the work that this Association accomplishes is something enormous and the whole of it is purely voluntary. "There is no great school of architecture in England," you said in the article that I have referred to. May I venture to assert that this Architectural Association might safely lay claim to such a title? When I have some spare space, I will send you a short description of our "great school of architecture," and I am sure you will agree with me that we are not so far behind our American confrères as would at first sight appear.

Chiel.

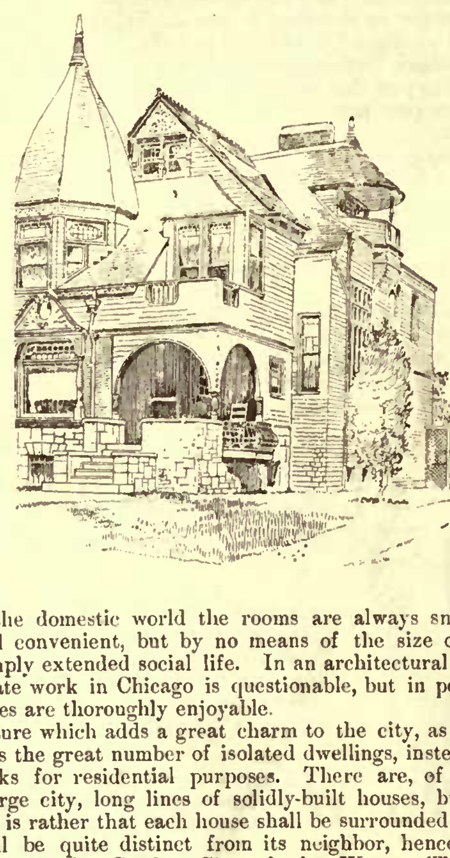
NOTES OF TRAVEL.

CHICAGO.—IV.[1]

As would be expected from a city which has attained its growth within the lifetime of the present generation, Chicago does not present very much that is of marked or peculiar interest in the lines of domestic architecture. It is, emphatically, a city of homes; indeed, the same might be said of the West as a whole; for with the surprising extension of business which has been so notable a feature in the growth of all of the Central States of the Union, the home-architecture has been, almost perforce, neglected, and business considerations have always received the most attention. But though the exterior treatment of the dwellings may have been to a great extent neglected, the interiors have always retained a charm, which is not peculiar to the West, but which might almost be classed as an attribute of American homes. They are comfortable, commodious, and, in a word, homelike. We know of no word so literally characteristic of the domestic architecture of Chicago; and it applies both to large and small buildings. Indeed, considering the immense amount of wealth which is concentrated in Chicago, it is apt to strike one that there are no large, palatial houses in the city. There are few that would suggest the presence of millionnaires. The writer was commenting upon this one day to a leading Chicago architect, who replied by calling his attention to the fact that on the corner where they stood dwelt a man whose property was valued at two million; directly opposite lived another worth a million-and-one-half; next door was one worth three-quarters of a million, and so on down the street, the aggregate amount of property represented by owners of the houses reached twenty or thirty millions; and yet the appearance of the houses was not such as to lead one to think that they were the homes of wealth. They had more the appearance of small cottages enlarged, as though the original, homelike type, so common all over the country, had been clung to even in the millionnaire's palace.

Of course, this does not apply, altogether, to the new work. There are many houses which show a larger and broader feeling for domestic architecture, and give evidence of an appreciation of the comforts which wealth can furnish in the line of better architecture. Still, the sentiment is, if we may so express it, from the cottage up, never from the palace down, so that one is apt to belittle the importance and the value of these private residences.

The same general facts are true of the interiors of the Chicago houses. Large rooms, as we understand them in the East, seem to be rather the exception, and rooms not over twenty feet square are considered large enough for most purposes. Only in a few instances is there any tendency to spacious apartments. One would rather expect the contrary in a city like Chicago, where the very sentiment of the air seems to call for spacious rooms and generous apartments; but however disposed to magnitude the Chicagoan may be in business



life, in the domestic world the rooms are always snug and small, cosy and convenient, but by no means of the size or style which would imply extended social life. In an architectural sense most of the private work in Chicago is questionable, but in personal feeling the houses are thoroughly enjoyable.

A feature which adds a great charm to the city, as well as to the houses, is the great number of isolated dwellings, instead of continuous blocks for residential purposes. There are, of course, as in every large city, long lines of solidly-built houses, but the rule in Chicago is rather that each house shall be surrounded by its garden, and shall be quite distinct from its neighbor, hence Chicago has been termed the Garden City of the West. The commercial traveller who sees only the down-town life of Chicago, especially if he happens to strike the city in the winter time, would not appreciate this appellation; but any one who is familiar with the magnificent avenues along the lake and has seen them at their best, when the long lines of trees are in foliage and the refreshing breezes are blowing from the lake, knows what a beautiful city Chicago really is, and understands in a measure the intense pride the Chicagoans take in their city.

In domestic as well as in public architecture nearly all of the work represents a growth from within. This does not imply that all of the architects are native born. Chicago is too young a city for that; but, at the same time, the Chicago work is mostly done by Chicago architects, and the most satisfactory work, on the whole, is that which has been wrought out by members of the profession who claim the West as their home and Chicago as their adopted city. Chicago is ever ready to borrow from the East, West, North and South, but she is determined to put her own stamp upon what she takes. The stamp may be ugly, and the result of the borrowing even disastrous to the borrower, but in the end the city is the better for it, and the growth which has been so noticeable a feature of her art-life is largely due to the unceasing desire and determination of the architects to have nothing but the best and to accept nothing but

[1] Continued from No. 635, page 91.

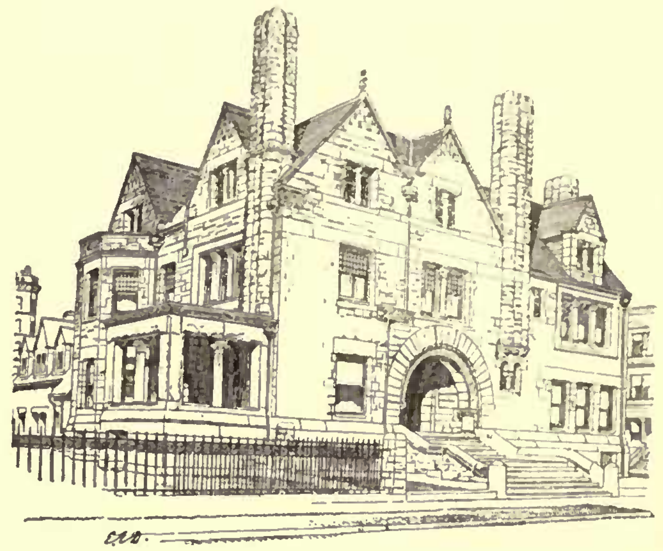
what is first-class, so far as they can understand it and so far as they can obtain it. If Chicago houses are not types of the best phases of the private architecture of the country, it is certainly no fault of the local architects. A more wide-awake, energetic and untiring body of professional men, it would be hard to find in any other city in the country.

While the Chicago houses are comfortable and homelike, we do not find in them, as a rule, the same care in planning or the same forethought in arrangement which ought to mark the best houses, and which, we are fondly assuming, is a feature of the best side of American architecture. The houses are not always planned carefully so as to secure the best light or the greatest amount of sunshine in the rooms which need light and air; and certainly in the majority of cases there seems to be a lack of the little niceties of execution and detail in regard to proper arrangement for heating and ventilat-

ing, which one might reasonably expect, considering the amount of money expended. Chicago has a very severe climate, much more so than any city, we believe, on the Atlantic seaboard; and yet few of the houses are as well protected against the weather as a client would demand them to be in the East. These defects, however, if, indeed, we may term defects what are due mainly to the influence of surroundings and past generations of architects, who were little more than builders — these defects are by no means due to bad builders or to a lack of competent mechanics. The architects say that the mechanics do excellent work when they are called upon to do it, and that if the work is not up to the Eastern standard, it is simply because the desires of the community are not as exigent as elsewhere. In some respects, we fancy, the Western builders are ahead of their brethren in the East. The brickwork certainly seems to be exceptionally well laid, and some of the large buildings show that, on the whole, rather better work can be obtained from the laborers and bricklayers than is had in the East. Possibly Chicago archi-

tects might tell a different story and say they have the same difficulty with flushing joints and grouting which we have in the East, but the appearances would indicate on the whole, a better quality of masonwork than is generally found elsewhere. In the working of copper and galvanized-iron Chicago is decidedly ahead of Boston and New York. This is largely due to the extensive employment of galvanized-iron as a building material, which has been the means of training the workmen to a familiarity with the material and with the means of working it. Some of the copper-work which has been executed of late years in Chicago is very nicely done, clean and sharp in its lines, well put together and showing far more than an average mechanical ability. This is independent of the design, though for that matter the Chicago architects have used both galvanized-iron and copper so much that when one gets a good idea in form, it is generally carried out in a very successful manner.

Not all Chicago houses are by local architects. Mr. Richardson has left several marks of his genius, notably the Glessner residence at the corner of Eighteenth Street and Prairie Avenue, a low, rambling *manoir*-sort of house, with many picturesque turns, wide-arched doorway, and curious little windows, the whole wrought out in heavy granite, with hardly a detail anywhere, but great, bold masses, which give a wonderful character to the design, a character which would perhaps be more pleasing if it were found in connection with wide grounds, leafy avenues and rural surroundings, but which of itself is none the less pleasing here.



Next door to this is a house by Cobb & Frost, which is very cleverly planned and shows the influence of the architects' early Boston training in the arrangement of its rooms, the placing of the staircase and several minor features which have a homelike suggestiveness.

A better house by the same architects is at 2846 Prairie Avenue, the home of Mr. Bartlett. It is a large, square house built of a very hard granite, sober and well-balanced in the exterior, and with a most excellent plan — one of the best the writer was privileged to visit in the city. Some of the copper-work on this house is exceedingly delicate both in design and execution, and treated in a manner which we fancy would be a revelation to some of our Eastern copper-workers.

In sharp contrast to this house, with its rather gloomy external appearance, is a dwelling by Mr. Clay, a building which is so peculiar in some respects, and so good in others, that it should be seen by every architect who visits the city. It seems to be the fashion with some of the Chicago architects to rather make fun of this house, and we were told that the owner was very much disgusted with it when he returned from Europe to find the house completed, but it is so far above the ordinary Chicago house in style that, notwithstanding the eccentricity of color, it is certainly worthy of a great deal of consideration. The color is the questionable point. The basement is built of a buff or brown sandstone; the first story is of a chocolate brick, with stone trimmings; above this is a panel of terra-cotta; the second story is of a light-buff Milwaukee brick; a wide frieze of blue enamel brick with brown enamel patterns runs around the building above the second story; the trimmings of the second story and of the dormers are of terra-cotta; the roof is of purple slate, and the ridges and side bay-window are of copper left its natural color. The combination of tones looks as strange as it sounds, especially now while the house is very fresh and bright, and the blue enamel and buff brick stand out conspicuously in contrast with the purples and browns. But it is an effect which will sober in time, and in a few years we question whether the appearance of the house will be so eccentric as it now seems. The form is good and the details are thoughtful and very well executed; the carving is really very well done, so that the house is one that has everything to gain and nothing to lose by the ravages of time and cold weather, conditions which exist for very few houses.

There is a very good house on the North Side, at the corner of Ontario and Cass Streets, erected for Judge Tree, the Belgian minister, from the plans of Messrs. Peabody & Stearns. The material is Longmeadow sandstone, which was brought all the way from Worcester, the local stone not being thought good enough, though for that matter the Chicago market is very rich in good building stones.

A block above this house, at the corner of Erie Street, is a very pleasing house by Messrs. Cobb & Frost. It is built of a beautiful pink sandstone, which is known as the Kisota stone, and comes, we

believe, from Lake Superior. The details are very nicely worked out, the carving especially being excellent in its quality.

The North Side is particularly rich in good houses, partly because it was the region which suffered most in the great fire of 1871, and has offered a more unobstructed field for the architect. Beginning at the water-works, a magnificent avenue is carried along the very edge of the lake for a distance of fifteen to twenty miles. This avenue, before it reaches Lincoln Park, is built up with a number of very handsome residences. At the corner of the Lake Shore Drive and Bellevue Place is a house by Mr. Beman, very successful in its treatment and one of the best pieces of work we have ever seen from the hands of this architect. It is of stone, brownstone as we remember it, and is treated in the Richardsonian style, which has found so much favor with the Western architects, though we fancy this example is rather ahead of the average imitation.

Directly opposite this is a house by R. M. Hunt, of New York, a sharp contrast to Mr. Beman's house in that it is built of light stone and is in the delicate Francis I style which Mr. Hunt employed for the Vanderbilt house in New York. This example is much smaller than the New York house, but is very pure in its details and in thorough harmony and good taste.

Farther down on the Lake Shore Drive is the house of Potter Palmer, a heavy, castellated affair — a castle at top and a conservatory at the bottom, as an architect explained to us — a not altogether pleasing example of what domestic architecture might be, although in its plan and general arrangements it more nearly approaches a palatial residence than any which we examined in Chicago. The rooms are large and the grounds around are very extensive, so that, though the architecture is rather questionable, the general effect is by no means bad.

Close by this is a house ascribed to Mr. Richardson, though we believe it was erected after his death by his successors, Messrs. Shepley, Rutan & Coolidge.

The houses alluded to are types in their way, and seem to be the best, all things considered. Still it must be remembered that the domestic is not the most successful side of Chicago architecture. The West is too busy for the elaboration and quiet thought involved in good domestic architecture. So long as the house is comfortable and fairly good looking, we can hardly expect anything more for a generation to come.

We once heard a very sharp critic sum up the Chicago club-houses as being unambitious, unluxurious and unsuccessful. We think this is hardly fair to the club-life of the city. The citizens are too preoccupied to evolve such institutions as the Union League Club in New York or the Somerset Club in Boston, and it is not strange that the growth in this direction has been small; still, so far as the clubs have gone, they have been anything but a discredit to the city. If a club is a place of meeting, a sort of business-exchange room, or convenient place to drop into for a lunch or an afternoon nap, the Chicago club-houses are thoroughly satisfactory, whatever their architectural attainments may be.

The Union Club-house, on the North Side, by Messrs. Cobb & Frost, is a quiet, substantial-looking building, furnished in thoroughly good taste and well adapted for its purpose. A view of this building was published in the *American Architect* some time since. This is, presumably, the best up-town club.

The Union League Club is rather larger and more spacious and is located in the centre of the city, serving principally as a place for a good business dinner or a down-town engagement. It was built from the plans of Mr. W. L. B. Jenney, and, without being at all ostentatious, is thoroughly comfortable and convenient.

With the growth in art which has marked the last decade, one might reasonably expect to find some vigorous training-schools for artists. There is an art institution housed in a comfortable building erected for it by Messrs. Burnham & Root; but, so far as could be ascertained, the art influences of the city in the line of direct training are inclined to be rather sporadic. The fact is, Chicago is not content with itself, but is constantly looking outside and drawing inspiration from every possible source, and with the whole world to choose from, it is natural that home schools should languish. This, however, does not imply that there is a lack of *esprit de corps* among the younger members of the profession. There is an architectural sketch-club which does very creditable work, and there is a very friendly feeling manifested among the members of the profession, who help each other and work together to an extent which has been equalled only by the members of the Architectural League of New York. One of the most hopeful signs of Western architecture is the desire and willingness of the architects to mingle together, to show each other their work, and to exchange criticisms. Only in such ways can growth come about. There is everything to be gained by intercourse, and we fancy that Eastern architects are sometimes inclined to disregard this means of progress.

C. H. Blackall.

The Pervasiveness of Lightning.—A correspondent of the *Springfield Republican*, describing the effects of a recent lightning-stroke, says that "the ceiling of the room had been replastered the preceding spring and the sand of this locality, which is used in mortar, is ferruginous. Every metallic particle in the latter the fluid seemed to have found and detached, so as to give the plastered surface an appearance better described as pock-marked than by any other words at my command."

Societies

THE GRANT MONUMENT COMPETITION.

On Thursday, the 15th inst., a committee of the Architectural League, consisting of Messrs. Warren R. Briggs, E. H. Kendall, Henry J. Hardenburg, F. A. Wright, Clarence S. Luce, and the President of the League, Mr. John Beverley Robinson, presented the following memorial, as ordered by the League at its last meeting, to ex-Governor Alonzo B. Cornell, Chairman of the Executive Committee of the Grant Monument Association.

To Alonzo B. Cornell, Chairman, and the Members of the Executive Committee of the Grant Memorial Association:

The Architectural League of New York herewith enters protest against the terms of your circular invitation to competitors for the Grant Monument bearing date January 26, 1888.

In its opinion many of the conditions as therein set forth are, by reason of their indefiniteness and ill-judged nature, such as will not attract designers of repute, and it would more specifically call your attention to the following sections of your circular.

1. To Section 2, in which the proposed cost of the monument is not stated with that assuredness and authority that will place competitors upon equal terms, the amount to be expended being practically left to the judgment of each.

2. Sections 5, 6 and 8, which permit designs to be submitted at different scales—one-quarter and one-eighth inch to the foot; in different mediums — line and "washed" or brush-made drawings; and in different materials — drawings or models.

To put competitors upon an equal footing there should be but one scale to which designs should be made and but one manner in which they should be exhibited, and to this one scale and one manner all should be bound. It has been found that a scale of one-eighth or one-sixteenth inch to one foot is sufficiently large to afford opportunity for the exercise of the most critical judgment, and pure-line drawings in pen and ink the most fair media of representation.

The precise nature and quality of sculpture should not be and is not now to be considered, its purpose and general intent being as well shown by drawings as by models.

3. To Section 13, which provides for the assumption by your Committee of the property-right in the chosen designs upon the payments of the sums set forth.

4. To Section 17, which, in the opinion of your memorialists, is the most faulty of the provisions. To request competitors to underbid each other in the price of their services is not the way to secure the best talent.

In conclusion, the Architectural League of New York has entered this protest wholly and only with the desire to point out to your Committee the faults in your circular which may render null your efforts, and to urge upon you the advisability of so amending your conditions that the best result may be reached in the best, most expeditious and most fair manner.

In pursuance of the latter desire, it presents for your consideration a copy of the instructions to competitors for the Indiana State Soldiers' and Sailors' Monument, which it considers a model in completeness and fairness and which competition has been brought to a most satisfactory and successful conclusion.

To Messrs. Alonzo B. Cornell, Chairman, and Richard T. Greener, Secretary, of the Executive Committee of the Grant Monument Association.

Gentlemen: The Trustees of the American Institute of Architects feel themselves obliged, in the interest of art and of the success of the project for erecting a monument to General Grant, to respectfully protest against the terms of the competition for said monument as they are now set forth, and to state their objections to certain sections of the circular in which they are contained, as follows:

Section 2. Cost is an element of great value in determing character of design; the amount to be expended is not definitely named, as it should be.

Section 4. The eminent experts who are to advise the Association in the selection of designs should be known from the beginning, so that such as have not faith in the judgment of the said experts need not compete.

Sections 6, 7, 8. All designs in the respective classes of Architects and Sculptors should be made to one scale and rendered in one manner. No architect should be *at liberty* to submit a model unless all are *required* to do so.

Section 13. As the first premium, the successful designer should be employed to execute his design at regular rates. The premiums named are insufficient in numbers and in amounts. No one of standing would willingly sell his design at the prices named or at much higher terms, and, moreover, an unexecuted design would be of no use to the Association except as a curiosity. All drawings, etc., save the one design adopted, should at once be returned to the authors.

Section 14. The Committee should only ask for a new competition on the recommendation of the expert jury.

Section 17. As above stated, the successful designer should, as a matter of course, be employed to carry out his design at regular rates. Competition, as regards rates of compensation, would neces-

sarily be demoralizing to the competitors and possibly to the judgment of the Committee.

While it is in accordance with extremely mercantile spirit to endeavor to obtain the maximum of value at the minimum of payment, yet such a principle applied to artistic work has a most depressing effect on talent, fails to call out high ideas, and drives eminent practitioners entirely away. A. J. BLOOR,

A true copy. *Secretary.*

THE MASTER BUILDERS' ASSOCIATION, BOSTON, MASS.

THE National Association of Builders, at its recent convention in Cincinnati, Ohio, after careful deliberation, formulated certain "Rules and Conditions" which Contractors may properly require to be observed by Owners, Architects and Builders when estimates are to be made.

The National Association recommends all its affiliated bodies to secure the adoption of these Rules as soon as possible, and further recommends, as the proper method of procedure, that the co-operation of architects be obtained in the establishment of the same.

In compliance with these recommendations, The Master Builders Association of Boston respectfully invites the Boston Society of Architects to appoint a Committee to meet with a Committee from its body to consider these Rules, and arrange a plan whereby they may be recognized as the proper system, and their general adoption obtained.

For the information of all who may be interested, this circular is sent to individual architects and builders, and their comments and suggestions invited for the assistance of the Committee.

March 19, 1888.

RULES AND CONDITIONS UNDER WHICH ESTIMATES SHOULD BE SUBMITTED BY CONTRACTORS IN THE BUILDING TRADES.

Complete plans and specifications.

1. General plans and details, when offered for final or competitive estimates, should be presented on a scale not less than one-eighth of an inch to the foot, should be done *in ink*, or by some process that will not fade or obliterate, and be complete in every part. Specifications should also be presented in ink.

Scale of drawings.

2. Such portions of the drawings as require a larger scale than general drawings, *for a thorough comprehension of what will be demanded* should be so presented.

Specifications to be definite.

3. Specifications should be definite.

All such indefinite demands as "The contractor must furnish all work that is necessary," or "All work that the architect may require," etc., etc., are *improper*, and should be eliminated before estimates are submitted.

Indefinite depth of foundation.

4. Estimates should not be given to cover an indefinite depth of foundation.

Foundations which have to go below the depths shown upon plans should be paid for as *extra work* at prices agreed upon.

The specification to be the guide for estimating.

5. The specification should be taken as the guide for estimating and all demands made by the specification — unless objection be made thereto in writing when bids are submitted — should be covered in the estimate offered.

Improper demands of plans.

6. Demands made by the plans, *and not referred to in the specification*, should NOT be considered in the estimate offered.

Grouping of special work.

7. Everything that will be required in the various branches of work should be mentioned in the specification, classified and grouped under appropriate headings.

Cutting and jobbing for other mechanics.

8. Specifications should distinctly state that when it is necessary to cut or change the work of one mechanic in the placing of the work of another, then the said cutting should be *done* by the mechanic whose work is so changed or cut, he being *paid therefor* by the mechanic whose work makes the said cutting necessary.

No restriction on sub-estimates unless notified.

9. Contractors, when required to estimate for work involving any or all the sub-contracts, should not be restricted as to whom they shall employ as sub-contractors UNLESS PREVIOUSLY NOTIFIED.

Percentage for sub-estimates added to contract.

10. Should portions of the work be reserved by owner or architect, and estimates therefore obtained by them, the principal contractor, if required to include the said sub-estimates in his contract, should receive a compensation therefor of not less than 10 per cent. on the amount of the said sub-estimates.

Opening of bids. Delay in awarding contracts.

11. Invited bidders should receive due notice of time and place of the opening of bids. Bids, upon being opened, should be immediately displayed to the inspection of all bidders, and for a period of three days thereafter.

Contracts should be awarded by owners or architects within a reasonable time (say ten days) after a competition is closed Contractors should not be holden on estimates retained longer than ten days before deciding to award contract.

Rights of lowest bidder.

12. In all cases where the work is let under plans and specifications prepared by an architect, for which estimates have been received and opened, the lowest *invited* bidder, should be entitled to the contract, and estimates for changes should only be made by him unless the said changes involve a complete alteration in the plans, and then the full competition should be again opened.

In no case should the two lowest bidders be called upon to estimate ordinary changes to decide which is entitled to the contract.

In case the price estimated for changes should not be satisfactory to the owner, it should be settled by arbitration.

Compensation for lowest bidder when all bids are refused.

13. Should all solicited bids received be refused, then the lowest bidder should be entitled to compensation as follows:

For estimates amounting to

$5,000 and under, ...	$25.00
$5,000 to $50,000, ...	$50.00
Over $50,000, ...	$100.00

No compensation for estimates should be required where the contract is awarded to the lowest bidder.

Security exacted.

14. When security is exacted from a contractor a like amount of security should be required of the owner.

Rights of sub-bidders in the hands of architects.

15. Sub-bids, when solicited by the architect, should not be shown by him nor exhibited in his office, but should be retained by the architect until the competition is closed and principal contracts awarded, when they should be disposed of in the way and manner provided in these rules, viz.: added to principal contracts (with a percentage — see Rule 10), *if agreeable to principal contractor* — or direct contracts made.

Rights of sub-bidders at the hands of general contractor.

16. A principal contractor having been awarded a contract involving sub-contracts, his estimate having been based upon sub-estimates, or bids which he has *solicited* and *received*, he should award the said sub-contracts to the lowest bidders, and should notify the sub-bidders that their estimates have been accepted or rejected as soon as the contract has been awarded to him. The fact that such sub-bids were received by the principal contractor, *previous to the submission of his estimate*, should be conclusive evidence that they were used by him.

Unsolicited bids.

17. Should a principal contractor receive a sub-estimate *unsolicited*, he should not be considered under obligation to use the said bid, even if it be the lowest; but he must not reveal the bid nor use it in any way to influence any other party.

Penalty.

18. Any member detected in trading on any of the sub-bids, whether they be solicited or unsolicited, or however knowledge of them may have come into his possession, will be liable to forfeiture of membership, censure or suspension.

Estimate in aggregate vs. estimate in detail.

19. Contractors should decline to give architects or owners estimates in the aggregate when the said architects or owners are soliciting estimates in detail, nor should estimates be furnished in detail when estimates are being solicited in the aggregate.

Penalty vs. premium on completion of contracts.

20. Whenever the completion of a contract will be required in a certain time, then that time should be mentioned in the specifications, and if a penalty for non-completion is to be exacted of the builder it should be so stated, and also that the owner will be required to pay a premium of like amount to the builder if the work is completed before the specified time.

Award of contracts, etc.

21. Contracts should be awarded upon the figures as shown at the opening of the bids.

Bidders should not be permitted to amend estimates after the bids have been opened, and previous to the award.

The bidder to whom a contract is awarded should be required to sign the contract for the amount of the bid he has submitted, or withdraw his estimate.

COMMUNICATIONS

FOR OUR ADVERTISERS TO CONSIDER.

ALBANY, N. Y., March 19th, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — I have just read your comment in your issue of the 17th inst. relating to advertising.

Allow me to say, that *my* experience proves to *me* that the most valuable place for an advertisement relative to matters with which architects deal is in such a journal as yours. Your advertising pages — as well as those in other professional journals — are of constant *use* to me. I make no attempt to remember the names and addresses of parties whose goods I wish to specify, consequently I refer to the architectural papers for them — and *quite* often do *not* find them — which nearly as often results in an advantage to those whose notices I *do* find. It is is quite as unnecessary as impossible to notify the makers or dealers of the fact that their goods have been specified to-day or were specified yesterday or will be to-morrow. Life is decidedly too short. Yours truly,

FRANKLIN H. JANES.

[IT is needless to say that the foregoing communication is a gratification to us, it is more, it is a surprise and a surprise because it is a long time since we have felt or looked for the help and direct personal encouragement

that our subscribers so freely gave in the days when an American architectectural publication of a high grade was a novelty and when every one felt that if such things were to be they must be supported. The *American Architect* is an "old story" now, whose mechanism makes so many revolutions between Saturday and Saturday, no one knows exactly why or how, nor really cares provided only the resulting grist is of satisfactory quality. We do not object to confessing that this letter is the most helpful thing the mails has brought us this year, and we are quite sure that if the architects now, as formerly they did, remembered the reciprocality of the relations which exist between themselves and this journal there is hardly one of them who would not take the time and trouble to write in similar vein. — Eds. American Architect.

RESTORING FADED BRICK-FRONTS.

Providence, R. I., March 20, 1888.

To the Editors of the American Architect: —

Dear Sirs, — Can you inform us through the columns of your journal, what can be done to renew the front of an old face-brick building that has been covered for many years with signs? It is proposed to take off all the signs, wash down the front and perhaps oil it, but we have seen in New York and the West what seemed to be a wash applied to a brick front to give it a uniform shade of color and to make the front more presentable. Can you tell us what is used and how it is applied? X.

NOTES AND CLIPPINGS

Pot-boilers. — I was taken behind the scenes to-day in a way that set me thinking. Happening to notice a pretty oil painting tucked away in a corner of a wholesale frame-moulding store I asked the price, and not only learned that, but quite a stock of useful information beside. It seemed that the painter was a well known and admired artist, but that being "hard up," he did these sketches as "pot-boilers," and sold them to dealers at a low price, signing them with a fictitious name. The idea was that, as an artist of recognized standing, he could not afford to sell his work on a bread-and-butter standard, but must charge what other well-known artists hold their own pictures at, even if they were not marketable at that price. Meanwhile he supported himself by anonymous "pot boiling." In other words, if "a patron of the arts" gave him a "commission" he would execute it for $100 or $150, and at the same time, or when the patron's money was spent, made other paintings of equal or better merit (for dealers know value quite as well as connoisseurs do) for $20 or $25. — *Boston Advertiser.*

A New Glass for Optical Instruments. — Perhaps the most wonderful thing that has been discovered of late is the new glass which has just been made in Sweden. Our common glass contains only six substances, while the Swedish glass consists of fourteen, the most important elements being phosphorous and boron, which are not found in any other glass. The revolution which this new refractor is destined to make is almost inconceivable, if it is true, as is postively alleged, that, while the highest power of an old-fashioned microscopic lens reveals only the one four-hundred-thousandth part of an inch, this new glass will enable us to distinguish one two-hundred-and-four-million-seven-hundred-thousandth part of an inch. — *Invention.*

Rats and Matches. — Fire Marshal Whitcomb, of Boston, has been recently experimenting with rats and matches, shut up together in a cage, in order to ascertain whether they were likely to cause fires or not. In the absence of other known cause frequent fires have been ascribed to their agency, while at the same time many underwriters affected to scoff at the idea. The question may, however, now be considered as settled. The very first night that Marshal Whitcomb's rats were left alone with the matches four fires were caused, and not a day passed while the experiment was being tried that fires were not set in this way. The rats were well fed, but they seemed to find something in the phosphorous that they liked. It was noticed that only the phosphorous ends were gnawed, and in nearly every instance the matches were dragged away from the spot where they had been laid. — *Fire and Water.*

TRADE SURVEYS

So far as the builders of the chief cities throughout the country have expressed themselves concerning building prospects for the ensuing season, their expressions are indicative of a strong faith in the repetition of the conditions of last year, substantially. It would be difficult to point out an industry that has not been placed upon a broader basis as to productive capacity, in view of the probabilities of a heavier demand. The question which a great many moneyed interests and manufacturers, as well as transporters of freight are discussing, is, will the additional productive capacity of the country be fully engaged? But one answer can be made at this time to this question: The expansion was dictated by experience and necessities. The business world of to-day is less liable than ever to make the mistakes of one, two or three decades ago. The building of houses has not been overdone. The anticipations which Boston builders entertain, are entertained by the builders of many cities throughout the West, as well as in the South. There is nowhere any evidence of an oversupply of houses, especially those of small cost. In several cities, such as Philadelphia, St. Louis, Cincinnati and some smaller cities, the building season will not open quite as early, but every possible preparation is being made, and if there is any dulness at the start, it will be made up for later on. One cause of hesitancy has been due to the supposed uncertain attitude of labor; the highest authorities in labor organizations have recently stated that there will be no organized effort in any part of the country to unsettle hours or pay. Isolated disturbances may arise, but so far as the advisers in the labor movement are concerned, existing relations will be harmoniously maintained between capital and labor, and furthermore, every effort of employers to lay the foundation for the adjustment of disputes, will be cordially met. The defeats which labor organizations have sustained, aided by the weeding-out of ambitious leaders who have impaired their usefulness, have created a conservatism which will go far to hold back that inflow of ignorance into labor organizations, which two or three years ago threatened to make them the absolute dictators of the world of labor. All such fears have been dissipated. In New England, the boot and shoe employers exercise more control over their shop-management to-day than they have for three years. In other branches of industry, the same is true. In the hardware industries, trouble was threatened a year ago, but it has disappeared. In the textile manufacturing establishments, there is contentment among 95 out of every 100 employés. In the larger manufacturing and mechanical establishments, there is nothing to jeopardize the friendly relations existing. The condition which exists in New England, is found elsewhere. The reaction has evidently set in among the workingmen of the country; the law-makers have answered their every request; the newspapers have given publicity to every grievance and every proposed remedy. The cases of the laborers have been faithfully stated, and, in fact, overstated, and they now at last discover that with all this assistance and with the aid of legislation, State and National, there are other things of far more importance to set about doing. Wages will remain substantially where they were last year. A downward tendency which might otherwise assert itself among the higher skilled workmen, is being checked by reason of the demand for skilled labor throughout the South. The depletion which has taken place in Northern mills, furnaces and factories, is not numerically very great; but the fact that there is a constant outflow of skilled labor from the North to the South, is indirectly helping to preserve a uniformity in rates of pay. This outflow of skilled and of common labor, will very probably continue until the South becomes a more important industrial centre in many respects, than New England.

There is a disposition all around, to defer the placing of heavy late orders and contracts; even tanners are finding the sale of their products slow. Lumber manufacturers are beginning to recognize the fact that the multiplication of sources of supply, with the resulting great variety of woods, is having the effect of giving prices a downward turn, rather than an upward. In order to offset this tendency, the leading spirits in the lumber trade have been making as extensive purchases of stumpage, as possible, both North and South, in order to have it in their power to control the supply in the interest of higher prices. The same controlling tendency is at work in several directions. The trusts and combinations that are seen on every side, are evidences of this desire to control, not only sources of supply, but avenues of distribution. The necessity for their existence will be demonstrated, and legislation and public intelligence will keep these powerful agencies within their proper limits. An unusually large supply of Southern pine will reach Northern and Western markets this season. About 400 miles of lumber roads have been projected since January 1, to develop Southern lumber territory, along the Gulf Coast and through the interior. Various estimates of the purchases of Northern speculators in Southern timber territory have recently been made; but the figures are merely guess work. It is safe to say that all Government timber territory and four-fifths of all the timber territory that can be had at $5 per acre and under, will, in the course of the next two or three years, pass into the hands of speculating owners. This speculating tendency in timber territory will overdo itself. Large areas are being purchased, containing timber which cannot possibly become marketable for very many years to come. The taxation is low, and the buyers will be content to hold for a generation or two, knowing that it will ultimately be a source of wealth. The iron-makers are pursuing the same course; but more of their money is going into property that requires constant replacement, such as furnaces, mills and factories. It has been estimated that the productive capacity of the South, at the present rate of progress, will be doubled within five years. Financiers have of late been frequently consulted by possessors of capital, large and small, as to the advisability of permanent investment in this new region. Their advice has generally been that the risks involved are at the minimum point, as compared to investments elsewhere. Twenty blast-furnaces will be blown-in this year; over 100 textile mills will be completed; some 15 or 18 rolling-mills are projected, and a host of smaller industrial establishments will certainly be built before the next frost, which will lay the foundation for further expenditures which will feed a host of industries throughout the country. This is the answer to the inquiry, "Is Southern prosperity permanent," which has been asked not a few times of late. The architects of the Northwest are greatly encouraged at the disposition of capital to make its permanent home in the new commercial centres of this region. The accumulation of wealth involves a good many other desirable conditions; the growth of art and architecture will naturally follow the solid planting of new industries. The growth of population that can be relied upon in the next three years, will make Chicago as independent of New York, in a commercial sense, as Boston is independent of it. A score or two of industries are galloping into prominence in that city; goods which for years past have been made and bought in New York, are now being made there. A family of industries is growing up in and around the commercial centre of the Northwest, which will make it, to a certain extent, financially independent. The fact that Chicago can make steel cheaper than Pittsburgh, according to Mr. Carnegie, shows the change that is taking place. With the cheapest lumber in the country, cheap coal, an assured supply of natural gas (?) and other advantages of a minor sort, it is safe to say that a new commercial empire will be created there, whose influence upon manufactures, trade, art and education, will be far-reaching. Reference is made to this underlying tendency in order to get at something else, which is beginning to crop out, viz., a commercial independence, so to speak, of section as against section. Thirty years ago, New England was the manufacturing centre of the country; Pennsylvania made the iron and steel for the nation; the South made its cotton; and Indiana and one or two adjoining States furnished its wheat. Within the last decade, these things have been changed; an industrial decentralization has been going on; Alabama can beat Pennsylvania in making pig-iron; Georgia yellow-pine can drive Michigan white-pine out of Chicago markets, almost; the South has ceased to kneel to King Cotton, and is making Pennsylvania iron-masters doubt whether they can enjoy their supremacy in iron-making much longer. In short, we are having an industrial breaking up; industries of all kinds are developing in localities where industries were, 20 years ago, never dreamed of. What has taken place in our industrial relations, will soon take place in our commercial and financial relations. New York, instead of being, as it has been for a century past, the financial centre, will share that service with Chicago, and later on with Kansas City and Denver, and later on still, with new centres of commercial activity whose names are barely known on the maps to-day. Out of this commercial development will come a degree of healthful activity and strength which will lift the nation and people onto a higher platform.

S. J. Parkhill & Co., Printers, Boston.

THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. XXIII. Copyright, 1888, by TICKNOR & COMPANY, Boston, Mass. No. 640.

MARCH 31, 1888.

Entered at the Post-Office at Boston as second-class matter.

CONTENTS

A CURIOUS discussion arose at the inquest upon the disaster at the Midland Hotel in Kansas City, by which the trusses over the large dining-room fell, killing a man who happened to be under them. The architect, Mr. Burnham, of Chicago, immediately hastened to the spot, and easily found the cause of the accident. It seems that the roof trusses, which weighed thirty-five tons each, were arranged to have their feet rest on iron plates, set on the brick wall. With their usual care, Messrs. Burnham & Root estimated the safe resistance of the wall, which they set at seven tons to the square foot, and, in accordance with this estimate, made the plates on which the feet of the trusses were to rest each three and seven-tenths feet in one direction, — the length, we may suppose, — specifying at the same time that the thickness should be two and one-quarter inches. After the accident they discovered that their drawings and specifications had been boldly disobeyed; that the plates were only one and one-half inches thick, and twenty-one inches, instead of forty-four inches long. Naturally, the weight, concentrated on an area not half large enough to carry it, crushed the brickwork, allowing the truss to fall. Mr. Burnham explained this very clearly to the coroner's jury, and was corroborated by the man who set the iron plates, who coolly said that the foundry-men often "made changes" in plans for buildings. It ought to be obvious enough that the whole responsibility of the accident should rest on the shoulders of the parties who deliberately and wilfully violated their contract to vary from a plan delivered to them, but it seems from the account that "the popular opinion" is that "the iron-men ought not to bear all the blame," and that the architect "should have inspected the construction at each stage." The origin of this theory, is, no doubt, to be found in the suggestions made by the iron-men to their friends, but we should hope that it might not be taken seriously. In a matter like this an architect with any considerable practice cannot possibly keep in his mind the details of all his buildings. Probably the plates, as they lay on the walls, looked large enough for supporting girders, or something of the sort; and it would be a superhuman architect who could always remember, when he saw a plate laid on a wall, what weight was to go on top of it. We remember a story told of Sir Gilbert Scott, whose practice was probably smaller than that of Messrs. Burnham & Root. Sir Gilbert had been commissioned to build two churches, about the same time. He "supervised" them with the care which is apparently usual among architects of distinction in England, until completion and consecration arrived. On his way, with his principal assistant, to participate in the latter ceremony at one of them, he was observed, on arriving in sight of the building, to turn pale for a moment. He held his tongue, however, like a politic person as he was, and seemed to enter heartily into the joy of all of the people about him. When the ceremony was over, and he was on his way home, he whispered to his assistant, "That was the wrong church!" Explanations followed, and it appeared that the draughtsman in the office had got the sketches of the two churches mixed, and had built at Y a church designed for X, and at X the one intended for Y. The church authorities were, however, none the wiser, and never complained; but the example shows the vigilance of supervision which was thought suitable for the head of the profession in England. To say that such a man as that ought to be wholly or partly responsible for an accident caused by the deliberate violation of his orders on the part of the contractor seems absurd; and if Messrs. Burnham & Root made their computations correctly and drew the plan for their iron work in accordance with them, we cannot see why they should be expected to learn their computations by heart and carry them about in their heads, or why they should be held in the slightest degree accountable for the effects of the contractors' deliberate and not easily detected disobedience.

OF late years, according to *La Semaine des Constructeurs*, a great number of incendiary fires have occurred in Russia. Twenty years ago only one and one-half per cent of the fires occurring in that country were set purposely. Now the proportion has changed, and, taking the country and cities together, about eleven per cent of all fires are incendiary, while in the rural districts seven fires out of eight are intentionally set. So serious has the matter become that several years ago the insurance companies refused to issue any policies upon houses in the country, and the village authorities were obliged to form mutual-assessment organizations among the population, as a substitute for insurance. Even this did not answer the purpose, incendiarism continuing almost unchecked; and the mutual-protection system has been entirely dropped in some places, while in others the premium rates have been made so high that the peasants will not pay them. In one province, however, a new experiment has been tried, which appears to work well. In the villages of this province the limit of risk upon any one building is set at forty-seven dollars, a sum which would not pay for a log hut; and the peasants, finding that they cannot get money enough to build a nice new house by the simple process of setting a torch to their old one, have not only stopped the practice of incendiarism on their own account, but have established night patrols to see that no amateur practices upon property which does not belong to him. The same device for preventing incendiarism, by refusing to insure any property to more than one-half or two-thirds of its value, is often discussed by insurance companies here, but the competition among the companies is so sharp that it has never been adopted; and any person can practically insure his house for any sum he pleases, the underwriters protecting themselves only by the privilege reserved in the policy of rebuilding the burned structure, in case of loss, instead of paying for it.

A HUGE engineering operation is under consideration in Holland. This enterprise aims at nothing less than the reclamation of the Zuyder Zee. This great estuary which extends from the northern end of Holland nearly to the Belgian frontier, covering an area of six hundred and eighty-seven square miles, and lined with flourishing seaports, is said to have been formed by a sudden irruption of the ocean in the year 1282, which broke away the protecting barrier of sand, dividing it into a range of islands much like our own Sea Islands, and covering a considerable part of Holland with water deep enough to float large vessels. In fact, as the North Coast of Holland is almost destitute of harbors, the Zuyder Zee became the refuge for multitudes of fishing and trading crafts, and the seaports upon its border, Amsterdam, Hoorn, Enkhuizen, Harlingen, Hindeloopen and Stavoren, grew so prosperous that the inhabitants of Stavoren, for want of anything else to do with their money, are said to have made the bolts and latches of their doors, the fittings of their boats, and even the weathercocks on their churches, of pure gold. Even now, an immense fishing and coasting traffic goes on over its waters, and the most elegantly finished and thoroughly appointed little steamer we ever saw, fitted throughout with incandescent electric-lights, and as comfortable and clean as a steamboat could be, once took us across it from Enkhuizen to Stavoren, but the channel connecting it with the North Sea is fast silting up, and the former glory of the towns on its shore is now to be inferred

from the beauty and richness of the old houses along their streets, and the splendor of the ancient pieces of furniture displayed in the bric-à-brac shops, among which we have seen a small sideboard, or rather, a sort of dining-room cupboard, with the front of solid silver. It is well-known that the beds, of lakes afford very rich land, and the Dutch engineers naturally have visions of the bottom of the Zuyder Zee covered with grass, and yielding food for great herds of black cattle, but the enormous expense of draining it has hitherto deterred any one from talking very seriously about the undertaking. Now, however, a powerful association has been formed in Holland, devoted to the object of raising money, and securing Government aid, for carrying it out, and it seems that it is likely to succeed. To construct the necessary works, and pump out the water from a navigable inland sea forty miles wide and seventy-five miles long, and fed by a dozen rivers, will take years of time, and twenty or thirty million dollars in money, but it is calculated that the sale of the reclaimed land, if carried on prudently, so as not to overstock the market in any one year, will repay the outlay at least twice over.

MANY architects will regret to learn of the death, at the early age of forty-two, of Mr. J. W. Kitson, of New York, one of the best architectural sculptors who ever came to America. Mr. Kitson was born in England, and served an apprenticeship with Messrs. Farmer and Brindley, the noted London stone-carvers. On completing his term with them, he resolved to try his fortune in America, and sailed for Philadelphia. Soon after reaching Philadelphia, however, he found that one of his old friends and shopmates, Mr. Robert Ellin, was in business in New York, and, joining him, the firm of Robert Ellin & Company was established. This became later the renowned firm of Ellin & Kitson, which has for twenty years executed a very large part of the best stone-carving in and around New York, and counts among its achievements many works which would do honor to any city in the world. For its success, the firm, particularly in its early days, was greatly indebted to the business-like methods, and earnest desire to please, of both its members. All architects who have practised in New York will remember the frank, pleasant ways of Mr. Kitson as well, perhaps, as his remarkable cleverness in designing and carving, and the profession will have good reason to deplore his loss.

LE GENIE CIVIL quotes from a military journal a rather valuable suggestion for deafening floors. This suggestion, which is due to General Loyre, proposes, instead of loading the floors with a sheet of plastering, to fill in the space between the floor-boarding and the plastering of the room below with shavings, which are first to be rendered incombustible by dipping them in a tub of rather thick whitewash. It is well-known that soft substances enclosing air-spaces, form the most efficient deafening, and shavings treated in this way are so incombustible as to add considerably to the fire-resisting quality of the building in which they are used. In cases where it is desirable to disinfect the space between floor and ceiling, the shavings may be saturated with chloride of zinc, or zinc chloride may be added to the lime wash.

FIRE AND WATER makes some sensible comments on the recent burning of the Union Square Theatre in New York, which most persons, familiar with the circumstances, regard as a fortunate event for the persons who have so often risked their lives by passing an evening in it. The theatre has long been known, in the words of *Fire and Water*, as "a rickety old death-trap," and it could not have been destroyed at a more favorable time, no one being in the building. The fire caught first in the hotel adjoining, and communicated readily with the stage of the theatre through one of the "fireproof doors" which closed the openings, through the wall. As soon as the flames reached the scenery on the stage side of the wall, the theatre blazed up like a stack of hay, and was soon in ruins; and if an audience had been collected in it, few would have escaped. According to a table accompanying the article, fourteen theatres have been burned in New York within the last twenty-two years. Most fortunately, the loss of life from these conflagrations has not been serious, but the fact remains that no city in Europe or America has had so many theatre fires in twenty years past as New York, and it is merely a piece of good fortune that half of them, at least, were not as fatal as the conflagration which destroyed the Brooklyn or Richmond theatres.

ANOTHER of the Paris bridges, the third within ten years, has given signs of collapse, and has been closed to travel while the work of repair is going on. The one now in trouble is the Pont d' Arcole, the well-known iron structure which connects the Hôtel de Ville with the region about the Cathedral of Nôtre Dame. The bridge, which is only about thirty years old, is composed of twelve arched ribs in the form of a low circular segment, about two hundred and sixty feet in span, and built up of plates and angle-irons. To regain the level of the roadway, long horizontal girders of iron are laid over the arched ribs, and the spandrels between the ribs and the girders filled with lattice-work. In order, apparently, to keep the horizontal girders from sliding out of place, they are anchored at each end to long rods, with cross-pieces at the extremity, buried in the ground. The probability seems to be that these rods were the first portions to give way. A few days ago the arched ribs were seen to have changed their shape, rising at one side, while the other sank, and the bridge was immediately closed. On examination it was found that all the rods on one side were broken off. Some of the breaks were old, but most of them showed recent surfaces, and as the people living in the neighborhood testified to having heard a succession of loud reports, it is quite likely that several may have given way together. Whether the breaking strain was caused by contraction, due to cold, or to the effect of the vibration of the bridge upon the rigid members connecting it with the mainland, no one can say positively, but both factors seem to have been of importance.

SHORTLY after the fire which destroyed in an hour or two the immense storage warehouse of the Berlin Express Company, a similar conflagration broke out in a large building in Birmingham, built in the same way, with iron beams supported by iron columns. This seems to have burned even more rapidly than the Berlin building, which, however, was greatly protected by its brick partition wall, and in a few minutes all the floors and roof had fallen into the cellar, and the walls were shattered beyond repair. A New York architect would have predicted just this result, but it seems to have been a surprise to the people of Birmingham, and the *Daily Post* of that city calls upon the authorities to forbid for the future the construction of such buildings, much as the New York newspapers railed at our iron construction after the first fires which demonstrated its weaknesses. The fact is, as *La Semaine des Constructeurs* points out, that no material known is so well suited for resisting most of the strains occurring in buildings as iron, provided the metal is properly protected from the influence of fire. The best methods of affording this protection are well understood here, but in Europe they have as yet been little practised, and *La Semaine* calls upon the French architects to "enter upon a new course," and adopt the system of protected construction "already in use in other countries."

THE *Revue Industrielle* gives some statistics of the amount of steam-power now in use in different parts of the world, from which it appears that the United States consumes more power from stationary engines than any other country, the total force of all the stationary engines now in use in this country being seven and one-half million horse-power, while all those in England only amount to seven million horse-power, those of Germany to four and one-half million, those of France to three million, and those of Austria to one and one-half million. Whether this estimate includes the engines of steamboats we are not informed, but if it does, we may well be surprised at the development of manufactures which should have placed our own country in advance of the combined manufacturing and commercial energy, as expressed in units of steam-power, of Great Britain. If we add the power of the one hundred and five thousand locomotives known to exist in the world to that of the stationary engines, and reduce the total by the ordinary rule of regarding one horse-power in a steam-engine as equivalent to the labor of twenty-one men, we shall find that the steam-power at present available in the world is equal to the force of about one thousand million men, or, to put it in another way, the accumulation of capital and development of science have placed at the service of the fifteen hundred million inhabitants of the earth the labor of a thousand million more of the most obedient, faithful and untiring slaves that the world has seen.

NOTES OF TRAVEL.

CHICAGO. — V.[1]

Doorhead - Isle of France - after L'ART -

ABOUT the year 1830 a trading-post and United States fort was established on the banks of Lake Michigan, at a point where a small stream emptied itself into the lake. This post was named Fort Dearborn. A more unprepossessing site could hardly have been chosen in the whole of Illinois, and yet it was the beginning of the now mighty city of Chicago. The location for commercial purposes was excellent, being on the great highway of the lakes and in what has proved to be the great highway of travel from the east to the west. The country for miles around was at that time perfectly flat, rising hardly two feet above the lake, and being in many places, marshy and disagreeable in its aspect. The river, which for lack of a better name has been dubbed the Chicago river, was originally nothing but a creek, formed by the confluence of two small brooks, uniting about a half a mile from the lake shore and flowing thence towards the east. The river and its two branches formed a natural division of the territory since occupied by the city, into the North, South and West Sides. The South Side has always been the business portion of the city, and here all the heavier buildings have been erected, while the North and West Sides are mainly given over to residences except along the banks of the river. The South Side from about two miles below the river is also used for private purposes. The soil on the north side of the river is fairly suitable for building purposes. The South Side, however, where the best foundation was required to meet business wants, was, in the early history of Chicago, often flooded with water, both from the lake and from the river, and within the memory of many people now living in Chicago, the whole South Side has been under water. The city was built so close to the lake and river, and there was so little anticipation in the beginning of the subsequent growth which was to give Chicago its place among the great cities of the world, that the streets were raised hardly more than four feet above the lake-level. Of course, it was impossible to have any good system of sewers under such conditions, and in early days, the sewerage was something which the present inhabitants can hardly imagine. With the fire of 1871, however, came a great change both naturally and architecturally. The entire business portion of the city was swept away, only two buildings remaining in the whole district. The City Government, which had long understood the necessity for improving the natural conditions, immediately decided upon raising the grades of the streets, and the refuse material from the burnt buildings was used for this purpose, the levels being elevated, we believe, something like twelve feet, an undertaking which has hardly been equalled anywhere else in the world. It should be understood however, that this movement was partially begun at the time of the fire, but the fire left the way so clear that all the new buildings conformed to the new grade.

The conditions which now exist, are, in short, as follows: The soil upon which heavy buildings have to be erected is found to be a black loamy clay which at the surface is tolerably firm and will sustain a load of one to three tons per foot, depending upon the locality. A few feet below the level of the ground, however, the soil is quite soft, being, less stable the farther down excavations are carried, until, at a depth of from twelve to eighteen feet it is so yielding that nothing can be placed upon it with any reliance. Nor is this all. It has been discovered by many sad failures in buildings that there is a broad, subterranean layer of soft mud which lies directly across the most heavily built portion of the city, extending under the Post-Office and reaching from the lake to the river, a distance of three-quarters of a mile. The natural clay is bad enough but this soft mud is a constant source of trouble to Chicago builders.

It is with these conditions, upon such soil as this that the buildings we have described in previous articles have been erected, conditions probably not equalled for perverseness anywhere else in the world.

In order to attain the degree of thoroughness with which the present foundations are planned and executed, there has been a gradual development on the part of the architects and builders, a development not always keeping pace with the importance and size of the buildings, by any means, but the progress being none the less sure and the results none the less satisfactory. In the early buildings the foundations were built continuously under the whole structure, the footings being spread ten to fifteen inches each side of the wall, generally without any regard to the soil or the loads thereupon. The first step in improvement was to proportion the width of footings to the loads bearing upon them; but it was soon discovered that this was not sufficient. The wall will settle more than the pier and the corners of the wall will settle less than the centre, and it is not always expedient or possible to vary the footings under a single wall, while the superstructure remains the same thickness. On one or two occasions an attempt was made to solidify, as it were, the crust of the earth, by a heavy bed of concrete, which it was assumed would equalize the pressure and prevent any settlements. This plan was tried for the foundations of the Post-office and Custom-house, a large building erected under the supervision of the Government architect. A bed of concrete, some three feet in thickness, was spread over the entire area to be covered by the building, and upon this the walls and foundations were started exactly as if they were resting upon solid rock. The result has been most disastrous. There is not a wall in the entire building which has not been cracked through and through, nor is there a string-course or a cornice which can show anything like a horizontal line. The concrete-bed scheme proved a total failure, and has not been resorted to since. Mr. Frederick Bauman was, we believe, one of the first to thoroughly appreciate the problems involved in Chicago foundations and to devise a scheme for building upon such poor earth. The plan he adopted has since generally been followed in the construction of all the larger buildings. It is not a new principle, by any means: it is simply the old Gothic idea of building with isolated piers so that all the loads and weights are concentrated at points, and the foundations under these arranged so that the pressure on the earth shall be exactly equal in all portions. This is a scheme which requires the nicest of calculations, and, undoubtedly, it would seem almost impossible to so plan a building that the weights on the footings throughout shall not only be exactly alike in their action, but shall be so proportioned in regard to size that each pier shall settle at exactly the same rate without any crackings or detriment to the superstructure. This is, however, exactly what has happened in Chicago, and there are plenty of examples of buildings where the calculated result agrees exactly with the final condition of the building.

But, having arrived at the true system necessary for building upon such soil as underlies Chicago, there was still a difficulty before the Chicago architects. We have noted how the soil becomes very soft in proportion as one descends below the ground. It is, therefore, quite desirable that the foundations should be carried down no farther than is absolutely necessary. It is also important that each building should have a cellar under it both for convenience and for utility as regards business purposes. But, at the same time, it would not do to have the footing-courses project into the cellar. To obviate the difficulties involved in the use of deep foundations and to meet the requirements of the case, a scheme was devised which we think was first adopted by Messrs. Burnham & Root. This consisted in the use of iron or steel beams in the foundation.[2] Under each pier is laid a bed of concrete eighteen or twenty inches thick, the area being sufficient to distribute the load of the superstructure so that it will not average more than one and one-half to two and one-half tons per square foot. Upon this footing-course is laid a row of steel railroad irons placed six or eight inches apart, and extending nearly to the extremities of the concrete on all sides. Above this is laid a second tier of beams which cross at right angles and are the same length as the width of the layer below, but are not carried out on either side. Above this again, is a third row of beams laid at right angles with the second and again drawn in as before. If necessary a fourth row is placed above all, the area of the final layer being equal to the size necessary for the foundation pier. As the railroad irons are quite stiff and can be placed as close together as necessary, it will be appreciated that the foundations can be spread out with any desired rapidity without taking up a great deal of vertical space, thus permitting the bottoms of the foundations to be kept quite close to the cellar floor.

In one case of which we know the foundation was increased in width fifteen and a half feet in a vertical height of only nineteen inches. Of course, any such scheme of construction would be simply impossible with any other material than iron or steel. It should be said for this system that it is as yet untried by the test of wear. We believe there is no building with iron foundations that has been built over four years, consequently it cannot be determined with absolute certainty what will be the ultimate durability of this system. The iron beams are thoroughly imbedded in concrete which of itself would serve to thoroughly protect them from rust or decay, but, after all it is still an untried feature and some of the Chicago architects have not felt warranted in risking it, though as a rule it has been adopted by those who have planned the heaviest buildings.

In order more fully to illustrate the manner in which the foundations are planned and calculated let us suppose a given building and follow the steps which the designer would take in planning for the portion underneath the ground. At the very outset a departure is noticeable from eastern ways. The ordinary strength of floors in a building used for offices or business purposes is assumed to be one hundred and twenty-five to one hundred and fifty pounds per square foot, independent of the weight of material. This, of course, is none too much in considering the strength of the floors. At the same time, it would be apparent to any one that under no circumstances could any such aggregation of load come upon the foundations as would be represented by one hundred and fifty pounds for every square foot of flooring in the building. In times past Chicago architects figured on this basis and found that the walls and piers settled unevenly. The actual weight of one hundred and fifty pounds per

[1] Continued from No. 639, page 142.

[2] In the *Inland Architect* for March may be found a discussion and fuller illustration of this method. — EDS.

foot was purely theoretical and was never reached in fact, consequently in determining the loads which are to go upon the foundations the practice in Chicago now is to assume not over twenty-five pounds per square foot in addition to the weight of materials. We were told by one architect that in the Marshall Field storage-warehouse the load on the floors was assumed at fifty-five pounds per square foot in determining the foundations: but in ordinary office-building work it is estimated to be eighteen pounds per square foot. It will readily be perceived what an immense difference such a process of calculation will make in the size of the footings.

The ground under the foundations is assumed to be capable of sustaining a safe load of from one and a half to two and a quarter tons per square foot. Mr. Bauman, we believe, recommends one and a half, but in buildings begun since the first adoption of his system of isolated piers, much heavier loads have been placed upon the ground with perfectly satisfactory results. The loads on the piers of the Board of Trade Building vary from two and three-fourths to three and seven-tenths tons per square foot. The size of the footings under the piers and the corners is made less than that under the walls to offset the difference in settlement of the different portions of the building. It is found that a heavy pier will sink proportionally more than a light one, consequently the footings under the larger piers have, relatively, a greater area than those of the light ones. Again, it is necessary to take account of the material of which the superstructure is to be built. Thus a footing under a brick wall is made larger than a footing under a line of iron columns, so that, if both footings are loaded with the same weight per square foot, any inequalities due to the difference in settlement or compressibility between the brick wall with its many joints and the rigid line of iron columns will be entirely obviated. This may seem like splitting the constructional hair or sound like an impossibility, but it is what has to be done if the building is to stand properly in Chicago. And there is another arrangement which is sometimes carried out. The foundation is laid with the centre of gravity a little outside the centre of gravity of the wall above, the idea being that the building will settle inward and together rather than having any tendency to settle out or to dislocate or rack the floors.

To make sure that the loads and strains will act in the way they are calculated to act, it is necessary that the floors should be thoroughly tied and keyed. In the best work it is customary to join the beams so closely by means of tie-irons that the entire floor in each story is a solid frame, and any movement at one corner of the building is immediately felt at the other extremity, there being no allowance whatever for expansion or for loose joints. Furthermore, the walls are sometimes tied together in a manner which we believe has seldom been adopted in the East, though it is quite common in England. Continuous rows of hoop-iron three or four deep are built into the walls at regular intervals, extending entirely around the building, thoroughly tying the structure together and making it one compact mass.

In planning a Chicago building there are two grades which the more courageous of the Chicago architects put upon their drawings: one is the grade at which the first floor or street line will be started, and the other is the grade, a few inches above that of the street, to which the walls will ultimately settle. It must require a great deal of confidence in one's drawings and calculations to be willing to draw a line across the front of an elevation and say positively that the huge structure will settle to that exact extent, and yet that is what is repeatedly seen upon the drawings of some of the Chicago architects: Burnham & Root showed these two grades upon the drawings of their enormous Rookery Building, and the building has settled almost to a hair's breadth of the amount stated by the architects, and this, too, without any inequalities of settlement or the slightest difference of level between the two ends of the building. The same might be said of the Opera-house Building by Cobb & Frost. The long corridor of this building, which is not far from two hundred feet in length, gives an excellent opportunity to judge of any inequalities, and the writer was told that the greatest difference in level between the two extremities of the corridor after the building had ceased to settle was less than a quarter of an inch.

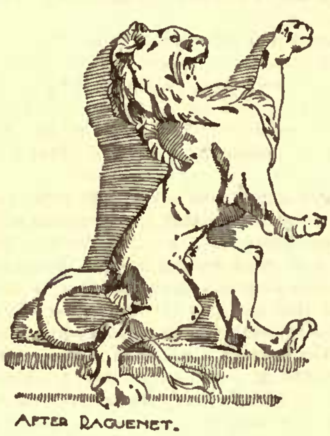
As regards the actual amount of settlement, this, of course, varies with the locality and the nature of the building as well as with the load which is placed upon the ground. In the early days builders did not dare to load their buildings very heavily, as their aim was to avoid any settlement whatever. It is simply impossible, with the Chicago soil, to avoid some settlement; it is bound to take place and the architect must so plan his building that the settlement shall be equal in all parts with a load of two and one-half tons per square foot. It is estimated that a building will settle about four inches altogether. The rate of settlement is pretty fast for the first year, and after that keeps on slowly for about three years, at which time all settlement ceases.

It must not be supposed that all Chicago buildings are built with the degree of care implied by the foregoing statements. In fact, most of the Chicago buildings are not well planned in their foundations and the settlements which take place are noticeably frequent. One building on Randolph Street to which the writer's attention was called settled in the central portions twenty-eight inches, while the side walls did not settle at all. Another building, which was erected in the fall when the ground was somewhat stiff with the cold, settled six inches during the next six months. Another instance is a building covering an entire block; one corner settled twelve inches, the adjoining corner settled six inches, and the diagonal corner did not settle at all. In this case the settlement was so marked that it shows very perceptibly on the front, not a single window-opening being square. There are so many unforeseen difficulties in the soil and in the superstructure that it is an exceedingly delicate task to properly proportion the foundations, and the only wonder is that there have been so many successes.

It might very naturally be asked why the Chicago architects have never resorted to piling. Aside from the expense and uncertainty attached to work of this kind, Chicago architects have apparently preferred to stick to the plan which they have laid out for themselves and to work it to final conclusions, rather than to resort to different methods of construction. There would be no real difficulty, however, in piling, as has been proved in many instances whereit was absolutely necessary. In the construction of the huge grain-elevators, which are scattered through the city, the loads are so excessive, reaching as high as six tons per foot, that it would be impracticable to support them upon ordinary footings, and piling has been resorted to. The piles are driven a distance of twenty to forty feet down to hard-pan, capped by wooden sleepers, with heavy wooden cross-beams and solid planking to receive the masonry. Even in piling, however, a system of isolated piers is adhered to, the loads being concentrated and the piles driven in clusters. Such is, in brief, the actual condition of the Chicago foundation work. It will be seen that the subject is a vast one, involving many possibilities of danger and uncertainty, but these have been bravely met by the Chicago architects, and though the successful attempts are almost the exception rather than the rule, they demonstrate the possibility of erecting the vast buildings on as treacherous a soil as exists anywhere in the world, with a surety in regard to final conditions and an almost absolute certainty of exact movements in superstructure.

C. H. BLACKALL.

OUR SENATORS AND THE CONGRESSIONAL LIBRARY.



AFTER RAGUENET.

ALTHOUGH there are some parts of the following discussion that seem to lack the perfect propriety of a dignified parliamentary discussion, it may be more useful than harmful to quote at length the remarks made in the Senate Chamber on March 7.

There is one remark by Senator Plumb that deserves all the weight of an aphorism, and might be kept standing in type at the head of a column in those journals which hope that, sooner or later, Government may adopt a wiser method of procuring designs for its public buildings than it follows at present. Senator Plumb states the situation well in saying: "When we consider the extravagance which the Government always indulges in in the building of public buildings, it is readily to be seen that a building which would cost the Government $100,000, *could not in any possible way be more than one-quarter the size of a building which private parties would build with* $150,000."

Mr. Daniel.—Mr. President, it is not my purpose to detain the Senate at any length on this question; but I think it my duty to reply to a few observations made by the Senator from Kansas [Mr. Plumb] on the 9th of February last.

On the 9th of February a bill was brought up here making an appropriation for the erection of a public building at Pensacola, Fla., whereupon the Senator from Kansas and other Senators took occasion to refer to bills which had been proposed for public buildings, and scattered their animadversions around so miscellaneously that it was difficult to understand upon whom their censure was directed.

The Senator from Massachusetts [Mr. Dawes] referred to the fact that in St. Louis a building had been commenced with an appropriation of $3,000,000, and, under the influence of public dinners at St. Louis given to the public architect, that appropriation was increased to $7,000,000. The Senator from Kansas [Mr. Plumb] followed up with some general observations on the subject, concluding with these remarks:

But something has been said about the reasons for these deficiencies. Mr. President, it is the old story of a dollar for the dress and $10 for the trimmings. Every public building which is put up costs ten times more for superintendence and extras and contingencies than it ought to do. Out of $100,000 appropriated to erect a building, say, out in Kansas, at least $10,000 of that money will be spent before ever a lick is struck. There is the city of Wichita, where the Government has simply a naked lot. There is no more danger of its being carried away than of this Capitol being carried away, and yet it has a watchman and a superintendent, but no man at work.

Mr. Hale.—They are watching the land.

Mr. Plumb.—Yes, they are watching the land. I do not know but that they are watching the Republican politicians out there. At all events, the watchmen are there, and they are getting paid for it. The Senator from West Virginia [Mr. Kenna] says to me that the Republican politicians there need watching. If they do you will have to appoint a great deal more clever people than you have done out there in order to make that watching very effective.

Mr. President, I have no doubt that there has been very gross extravagance in the matter of public buildings, and I am not disposed

to hold any one to responsibility for remarks which may inure to its correction; but I think it would be well if those gentlemen who are indulging in severe criticisms upon this floor and who are holding up a system of extravagance to public opprobrium would at the same time inform the public that their criticism partly belongs to an administration of which they were themselves supporters and that their criticisms cannot possibly be directed to those public officers who are now conducting this branch of the public service.

It is true that there is a public building in the city of Wichita, Kans., in process of erection, and if there be delays about it, or if watchmen have been retained there unnecessarily, and if that matter is to be made a subject of censorious comment upon this floor, it is fitting that those comments should give to the public the reasons for the action taken, and so that responsibility should be fixed upon the proper persons. I hold in my hand a letter of October 4, 1887, addressed to the Supervising Architect of the Treasury Department by the Senator from Kansas:

UNITED STATES SENATE, Emporia, Kans., October 4, 1887.

Dear Sir, — Permit me to call your attention to the public building which you are proposing to erect at Wichita. Since provision was made for this building Wichita has grown very greatly, and buildings five stories in height have been erected by private capital. I am informed that the plans as prepared in your office contemplate a building two stories in height merely. This will result in an inferior-looking building. I doubt also if the necessary room can be provided in a building of two stories, as you perhaps know there is a United States land-office at Wichita, and United States court is held there, and there will need to be a room for a post-office which does more business than any other post-office in the State of Kansas.

I write to suggest that you enlarge the building by adding a third story. If this should necessitate the omission of heating-apparatus from the estimates, I think without doubt this could be provided for at the next session of Congress. It would certainly seem advisable that the Government should erect such a building as would meet not only present but future wants in a satisfactory manner. Respectfully, yours, P. B. PLUMB.

SUPERVISING ARCHITECT OF THE TREASURY DEPARTMENT, Washington, D. C.

The Senator from Kansas, who led in these censorious comments on the Supervising Architect of the Treasury, is the Senator who signed that letter; it was under his advice and under his suggestion that any change which has taken place in the process of construction has occurred.

Mr. Plumb. — I wish the Senator would point out in that letter any recommendation or any suggestion or hint in regard to the employment or retention of watchmen or other employés about that building.

Mr. Daniel. — It is not my custom to find out in communications things that do not exist; and if the Senator from Kansas would conform himself to the same method of debate he would not have had this reply.

I am not attempting to hold that gentleman up to any reproach for writing this letter. I conceive that it is within the province of a Senator on this floor, or any representative of the people, to give his advice to those who may be in process of executing laws of this character. I do not charge him with usurping any function; but it does seem to me, as a gentleman fair-minded and just towards those whom he criticises, that when the Chief Architect was held up and pointed out as one who should receive public censure, instead of joining with the hounds to run him down, he might at least have taken his place with the hares on that occasion. I do not hold that gentlemen responsible, or say more about him than simply this, that in telling a part of the story it would have been becoming if he had told all.

Now, sir, let us see about this matter of a watchman.

. . . .

Mr. Plumb. — Mr. President, there does not seem to be any particular reason why this question should be lugged in at the present time, but if I had had my way about it I should have had the present Supervising Architect of the Treasury brought here under a subpœna *duces tecum*, with instructions to bring my letter, in order that it might be made public. It has no more to do with his employment of watchmen or superintendents of the building at Wichita than it has with the last change of the moon. I am so enamored of that letter on looking it over, that I will ask to have it read again.

The Presiding Officer. — If there be no objection the Secretary will read it.

The Secretary read as follows:

UNITED STATES SENATE, Emporia, Kans., October 4, 1887.

Dear Sir, — Permit me to call your attention to the public building which you are proposing to erect at Wichita. Since provision was made for this building Wichita has grown very greatly, and buildings five stories in height have been erected by private capital. I am informed that the plans as prepared in your office contemplate a building two stories in height merely. This will result in an inferior-looking building. I doubt also if the necessary room can be provided in a building of two stories, as you perhaps know there is a United States land-office at Wichita, and United States court is held there, and there will need to be a room for a post-office which does more business than any other post-office in the State of Kansas.

I write to suggest that you enlarge the building by adding a third story. If this should necessitate the omission of heating-apparatus from the estimates, I think without doubt this could be provided for at the next session of Congress. It would certainly seem advisable that the Government should erect such a building as would meet not only present but future wants in a satisfactory manner. Respectfully yours, P. B. PLUMB.

SUPERVISING ARCHITECT OF THE TREASURY DEPARTMENT, Washington, D. C.

Mr. Plumb. — I reiterate all I there said. Wichita is a city of 40,000 people, and it is a better town than any other town in the world outside of Kansas having twice the number of people. There is more activity in business, more business transacted, more necessity for a public building in Wichita than in any town in the United States outside of that State possessing 100,000 people.

The Congress of the United States was guilty of the worst kind of parsimony in providing for a building at that place to cost only $100,000. I was noticing the debate in another place the other day on a proposition to erect a public building at Birmingham, Ala., and it was stated with a flourish of trumpets that the postal receipts of that city were $36,000 a year. The proceeds of the post-office at Wichita are more than twice that much. Another branch of this Congress has voted $300,000 to erect a public building at Birmingham, on the basis of the gross postal receipts of $36,000, while it was only willing to pay $100,000 for the public building at Wichita. Since the time when that appropriation was made for Wichita single buildings have been erected in that city costing $150,000, and when we consider the extravagance which the Government always indulges in in the building of public buildings it is readily to be seen that a building which would cost the Government $100,000 could not be in any possible way more than one quarter the size of a building which private parties would build with $150,000.

Therefore, observing that the Government was about to erect a building in Wichita, not only inferior in character, but not up to the average of the business blocks in that city, I said to the Architect I thought on the whole he had better put on another story; but I omitted to say, as the Senator from Virgina did not seem to observe, that I thought he ought to keep up the quota of watchmen while he was waiting for an appropriation.

What I said about the Wichita building in the debate which is referred to here was merely an incident of what I was saying about the Library building. I do not intend that the Senator from Virginia, acute as he is, shall take me away from that fruitful subject. I do not mean that he shall get me into a contemplation of some practices of the office under preceding administrations, and thereby divert attention from what has been going on under this Administration in regard to the Library building in the shadow of this Capitol.

It was not a very heinous offense to keep a superintendent and watchman at Wichita, notwithstanding there was neither Government building nor Government property there, and I freely say that, so far as I have observed, he has economical tendencies. How soon he will get over them I cannot say. I think, on the whole, he has introduced some economies in the management of his office.

I had a talk with him on the subject of the watchman and superintendent being employed at Wichita. He said to me in substance, "If you want a superintendent and watchman kept there you will have to write me a letter recommending it." I said, "I do not think they ought to be kept there, and consequently I will not recommend it." He then said to me by way of palliation, very well illustrated by a story which I will not tell, that he would reduce the salaries, and consequently the offense of keeping them would not be a very large one.

I think that he intended to reduce the expenses of that building to the minimum. I believe he is sincerely desirous of economizing as far as possible in the expenditure of the public money. He cannot go too far, so far as I am concerned, in that direction. If he only spends in a judicious way the money that Congress appropriates, there will be no cause of complaint. But while this officer has been in office only six months the Administration which is responsible for him has been in power for over three years, and it will not do to say that because it has retained in office men whom it found here prior to that time somebody else is responsible and not the Administration.

But the matter of watchmen is not so conspicuous in the Wichita building as it is in the Library building. I have in my hand the report of the commission created by law to erect a Library building, and I find that in one year, in a single twelve months, that commission spent for watchmen $2,772.95.

The Pension building has been referred to sometimes in debate here, not always with words altogether complimentary for its architectural proportions, but it cost $800,000 and was nearly five years in building. The entire amount expended for watchmen during the nearly five years that building was in process of construction was only $2,711.10. In other words, there was expended for watchmen about that building during the nearly five years it was in process of construction less money than has been expended in one year — I will not say in the process of the construction of the Library building, because its construction has not yet commenced. Why, Mr. President, the plans for the basement for the Library building have not yet been drawn.

Mr. Voorhees. — That is not true.

Mr. Plumb. — It is true.

Mr. Voorhees. — I say it is not true.

Mr. Plumb. — I say it is true.

Mr. Voorhees. — I say it is not true, of my personal knowledge.

Mr. Plumb. — They will not be ready until to-morrow.

Mr. Voorhees. — I say they have been ready for six months.

The Presiding Officer. — The Senator from Kansas is entitled to the floor.

Mr. Plumb. — I am informed on what I believe to be good authority that there is an advertisement in one of the city papers stating that the plans or specifications for the foundation of the basement of that building are not completed, and will not be until to-morrow.

Mr. Voorhees. — There is no such statement in any advertisement in any paper in the city.

Mr. Plumb. — I am informed, upon what I believe to be a good authority outside of that, that when a few days ago the Secretary of the Interior came to consider the question of letting the contract or of advertising for a contract for the basement of that building, he

was informed that the plans and specifications for the basement had not yet been drawn.

Now, of course, I am not going to dispute with the Senator from Indiana in a way involving his veracity. He is unduly sensitive about this matter. I do not know that he has any more responsibility about it than I have. He has chosen to defend some things, and he is welcome to his defense; but so far as responsibility is concerned, I do not understand that he has any more responsibility than any other member of this body, or any other member of Congress, so far as that part of it goes, unless he makes himself so. If he proposes to defend these expenditures, then, of course, he becomes responsible. But what he says as of his own personal knowledge I will not dispute.

I said, and I repeat, that I have been told upon what I consider to be perfectly good authority that the plans and specifications for the basement story of that building have not yet been drawn, and I was told that I could find in a city paper, if I would look for the evidence of that fact, an advertisement made for contracts, stating in substance that plans and specifications would be furnished on the 8th day of March, which is to-morrow.

I am not going to say that it does not take more watchmen under this Administration than it did under former ones. There may be more to watch; there may be more necessity to keep on hand a big corps of men to see that somebody does not carry off the property or something of that kind; but the fact is, as I have stated, that on this Library building during twelve months $2,772.95 were expended for watchmen, while on the Pension building, which cost $800,000 and was in process of construction nearly five years, the entire amount for similar services was $2,711.10.

I have here a list of the employés of the Library building whose services cost last year nearly $29,000. A secretary cost $1,800; the messenger cost $600 a month; an accountant cost $1,500.

Mr. Voorhees. — No messenger ever cost $600 a month.

Mr. Plumb. — Sixty dollars a month I said, or meant to say.

Mr. Voorhees. — You said $600 a month.

Mr. Plumb. — Did I? Mr. President, I wonder he did not cost $600 a month.

Mr. Voorhees. — I wonder the Senator did not call it $6,000 a month.

Mr. Plumb. — In view of the wide field opened by this expenditure, I wonder myself the commission did not think it should be paid $6,000 per month on this work. It would have been a hundred times more judicious expenditure of public money than some I have evidence of here.

The disbursing agent cost $2,500 per annum. A man to help him cost three-eighths of 1 per cent, amounting to $253.23. Then the architect cost $5,000. Of course he had to have some one to help him, and he cost $3,000. Then there was a computer, who cost $125 a month, and then there was an expert in iron-construction at $6 per day. In iron-construction, Mr. President! Why, all the ironwork over there is not only in the imagination, but is in the bowels of the earth. An expert in iron-construction at the Library building, which consists up to date of a hole in the ground! No contract was let for anything beyond the footing-course for the walls. He and the civil engineer cost $6 a day each, an expert in heating $6 a day, and another expert in iron-construction cost $7 per day; a draughtsman cost $7 per day, and the plans for the basement are not yet drawn! Then there is another person who was employed as draughtsman at $5 a day, and another draughtsman at $4 and $5 per day. Whether that meant $9 per day, or whether he was worth more some days than others, I am not prepared to state. Another draughtsman cost $5 a day, and another one cost $3 and $4 per day. Some days I suppose he was better than others. Another draughtsman cost $2 a day, and then another draughtsman cost $125 and $150 per month. I suppose he was employed on the evolution plan, so to speak. They got better as they went on; they were more competent to do that nothing which the commission seemed to be determined upon doing. The further they got the longer they were employed; certainly the less chance there ever was of having a building, their services becoming more ornamental and less useful, and consequently they were entitled to greater pay.

Mr. Hale. — What is the item the Senator read in regard to a disbursing officer?

Mr. Plumb. — There was a disbursing agent at $2,500 per annum.

Mr. Hale. — What has the disbursing agent to disburse?

Mr. Plumb. — If the Senator had looked at these figures he would see that the disbursing agent has been the most laboriously occupied of all the persons employed about that building.

Mr. Hale. — In paying these employés?

Mr. Plumb. — He has disbursed $98,000 during the past year. All that has been done over there, it seems, is the disbursement.

Mr. Hale. — For which he has had $2,500.

Mr. Plumb. — That man, in comparison with the other persons employed there, ought to have received $10,000.

Then there is a clerk at $120 per month. Then there is another clerk at $120 per month; there is another messenger at $60 a month; another one at $2 a day, and a sculptor at $5 a day.

That is the list of the employés, the total compensation for which amounts to $28,839.88, and does not include the watchmen, who received during the same period $2,772.95. I am willing to admit that any possible condition of things existing in Wichita is a mere bagatelle by comparison with what has been going on here under our very eyes. If the Architect of the Treasury had been intending to follow the example which has been set by the Library Commission there would not have been anything left of the Wichita appropriation of $100,000 — not a dollar — it would all have been gone.

But as the Senator from Louisiana says, very properly, he has had nothing whatever to do with these expenses. I think I am willing to go further, and I say in view of the letter which was written to him by the member of the House representing the district in which Wichita is situated, that he was fairly warranted in maintaining for the time being a force there in anticipation of an appropriation which may or may not come.

One thing, however, I have observed, that whenever any Republican on this floor or elsewhere has anything to say about any mismanagement or extravagance on the part of this Administration, some one turns around and says that all grows out of the fact that some Republican had something to do with it. I have heretofore spoken of that as pleading the baby act. I cannot think of anything more expressive than that phrase. Who is responsible for the Republicans who are in office to-day. Of course, I think on the whole it would be pretty well to follow Republican advice, but to say that because certain persons are in office who are members of the Republican party relieves the Administration from responsibility is going too far.

Mr. President, I do not intend to work this deposit out now. I intend to keep this thing on hand. I have only just simply got under the cover. When I look at the milk in this cocoanut, when I contemplate all this array of figures from the advertising in the newspapers, the taking down of the houses, the cleaning away of the material at the expense of $13,000 at a return of about $2,000, the erection of a carriage-house for the architect, the fitting up of the blue-print room, and so on, I realize that I cannot do the subject justice at one effort, nor perhaps at twice trying. So I think I will leave the balance of it until further debate. Whenever the debate shall lag, and whenever my friend from Indiana shall have gotten into that good humor for which he is proverbial and can bear a little more, I think I will go further into this great mine that has been opened up here in regard to the construction of this Library building, which is so dear to his heart, for which he has labored so many years of his public life. I was not on his side, but still I responded most thoroughly in my admiration for him in his faithful, eloquent work to bring about the erection of a Library building, and the surprise I have is that there is nothing now but a hole in the ground after this great expenditure of public money in place of a building.

. . . .

The Presiding Officer. — The question is on the amendment of the Senator from Ohio [Mr. Payne].

Mr. Voorhees. — Mr. President, if any one expects that I rise to make any extended reply to the remarks of the Senator from Kansas [Mr. Plumb] he is mistaken. I am not in condition to speak to-day, and I do not desire to do so. If the Senate has a disposition to allow the genial Senator from Kansas to amuse himself by an assault of this kind on those who have charge of the work of the new Library building——

Mr. Plumb. — Will the Senator allow an interruption?

Mr. Voorhees. — Oh, yes.

Mr. Plumb. — Here is the advertisement to which I referred:

Office of the Commission for the Construction
of the Congressional Library Building,
No. 45 East Capitol Street,
Washington, D. C., March 1, 1888.

Sealed proposals will be received at the office of this commission until 12 noon on the 31st day of March, 1888, for furnishing the dimension stone required for the walls of the cellar or sub-basement story of the Congressional Library building, to be constructed in Washington, D. C., upon the form of proposals and in accordance with the specifications and plans therefor. Copies of specifications, etc., will be furnished to intending bidders on application to the architect at this office, and detailed plans of the same may be seen at the same office on and after Thursday, March 8, 1888.

William F. Vilas,
Edward Clark,
A. R. Spofford,
Commissioners.

Mr. Voorhees. — You will find the advertisement says that bidders can have the specifications to-morrow, but it does not say they are not prepared.

Mr. Plumb. — No, but it is significant that they are not already prepared.

Mr. Voorhees. — Everything is significant to the Senator from Kansas.

Mr. Plumb. — The advertisement bears date the 1st day of March. It was published on that day —

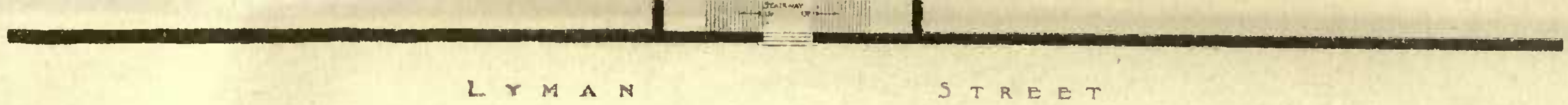
Mr. Voorhees. — Please get through. I am tired.

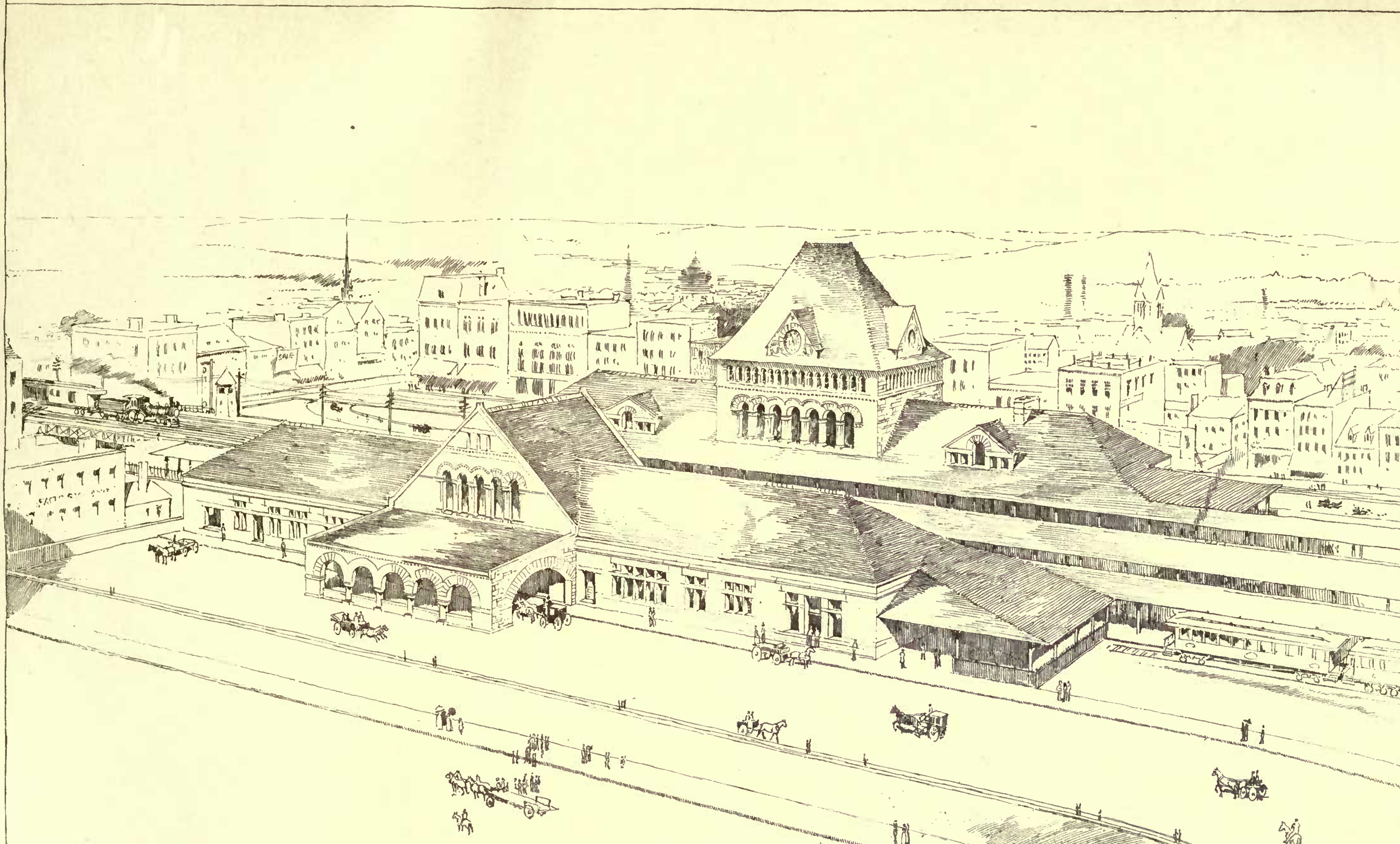
Mr. Plumb. — I will get through now or some other time.

Mr. Voorhees. — It does not make any difference to me.

Mr. Plumb. — It is a little bit significant and I think supports the allegation which I made, that for seven days after the advertisement was printed the specifications could not be seen in the office of the architect.

Mr. Voorhees. — The Senator from Kansas said I was sensitive in regard to this matter, as if I was more responsible than others on the subject. I confess to the fact that this building for the Library is a favorite measure with me, but I stand charged with no more responsibility about it than any other Senator here. It is now eight years since the committee to which I have the honor to belong was created to take in hand the subject of the erection of a library competent to take care of our great wealth of books. The Senator from Vermont

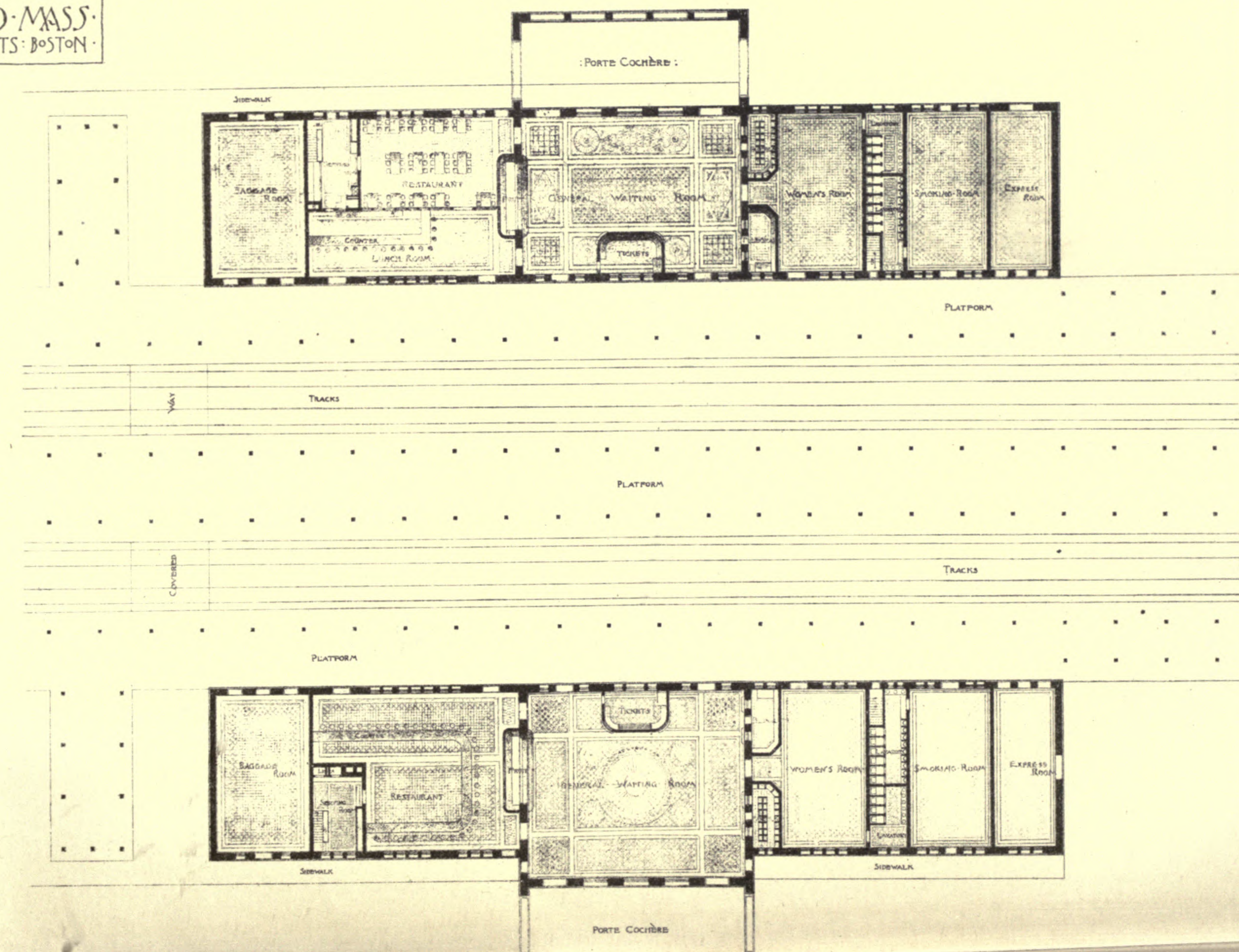




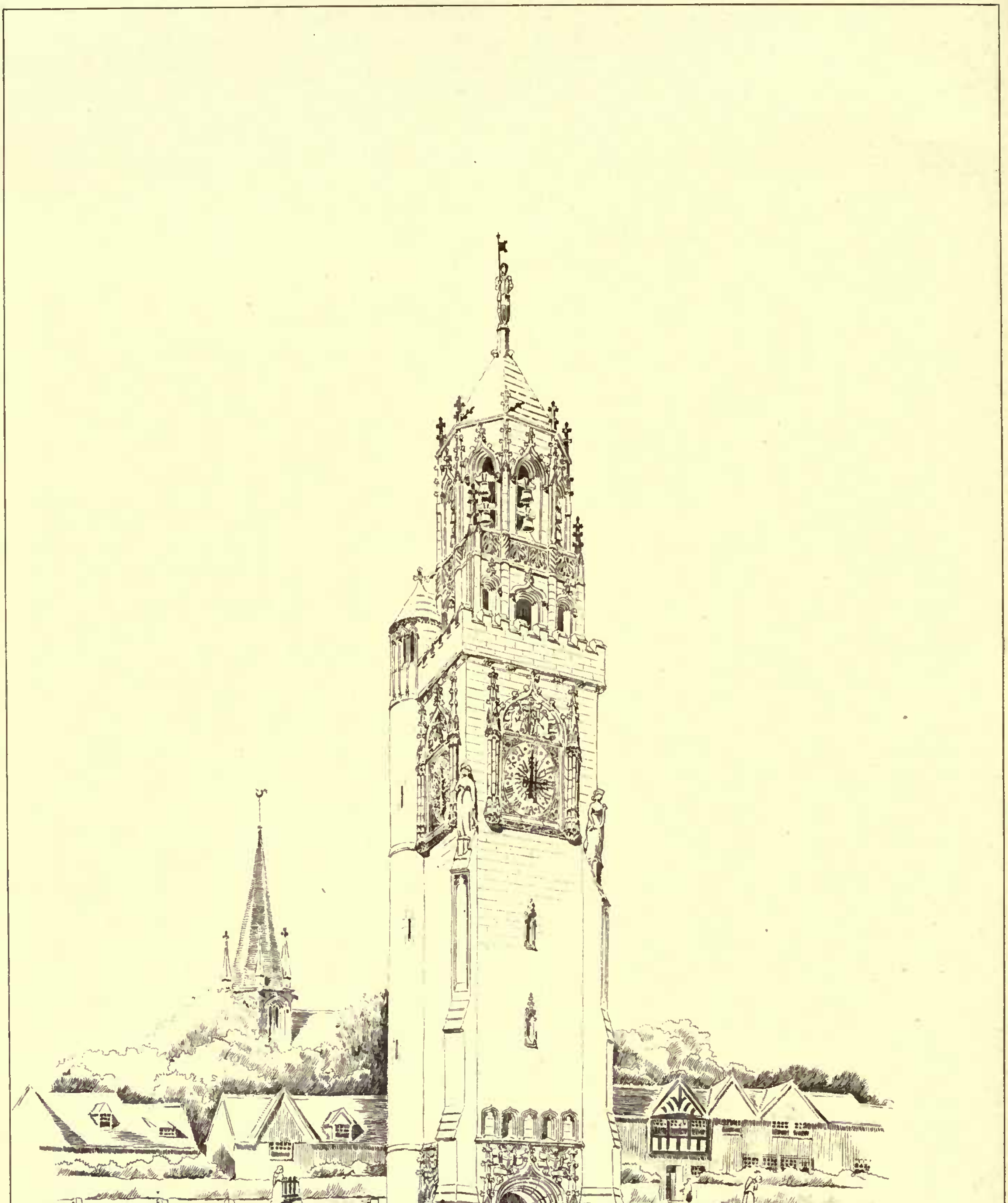
Heliotype Printing Co. Boston.

COPYRIGHT 1888 BY TICKNOR & CO

· BIRDSEYE · VIEW of · PROPOSED ·
· STATION AT SPRINGFIELD · MASS ·
· SHEPLEY · RUTAN & COOLIDGE · ARCHITECTS · BOSTON ·

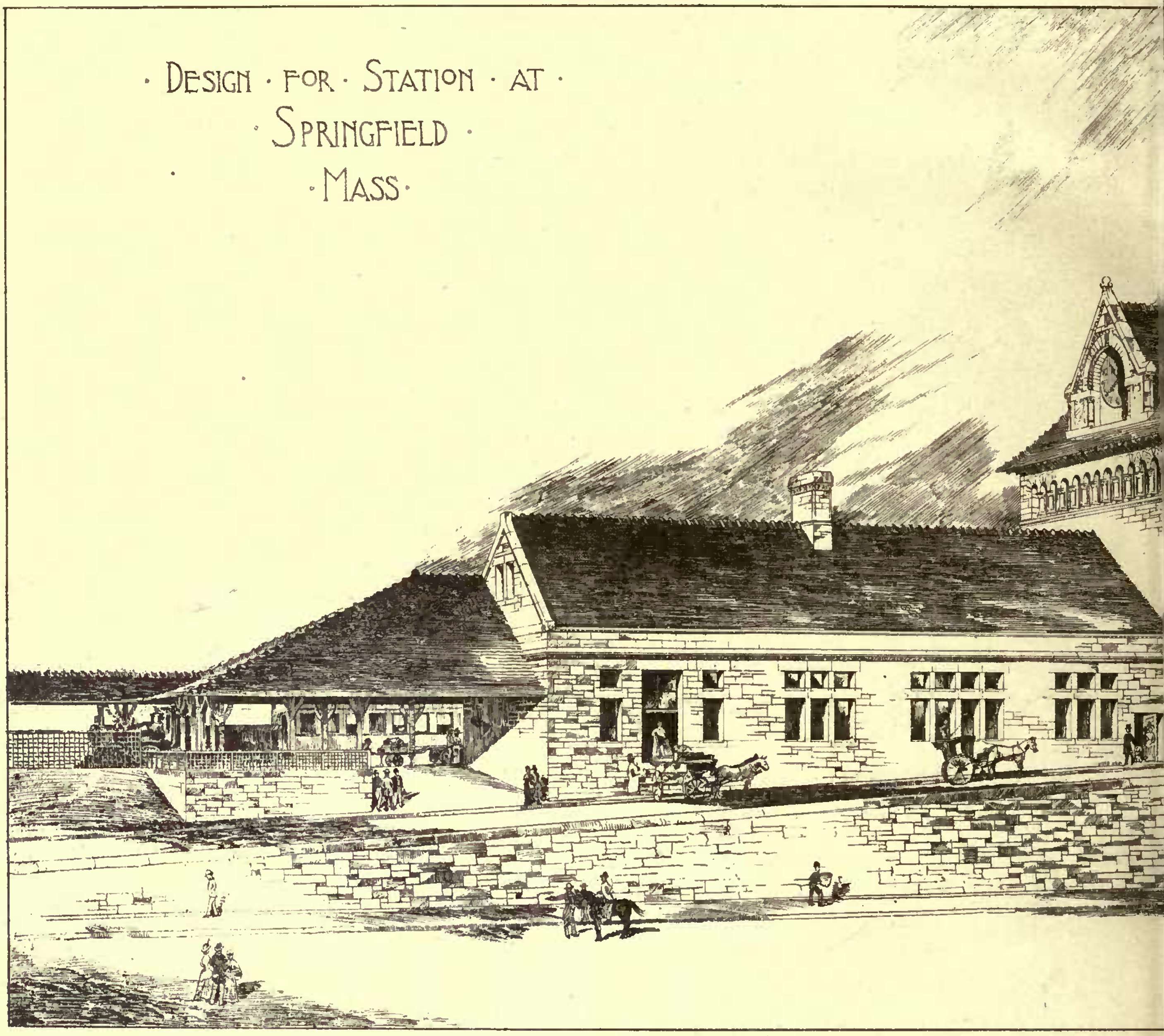


COPYRIGHT 1888 BY TICKNOR & Co

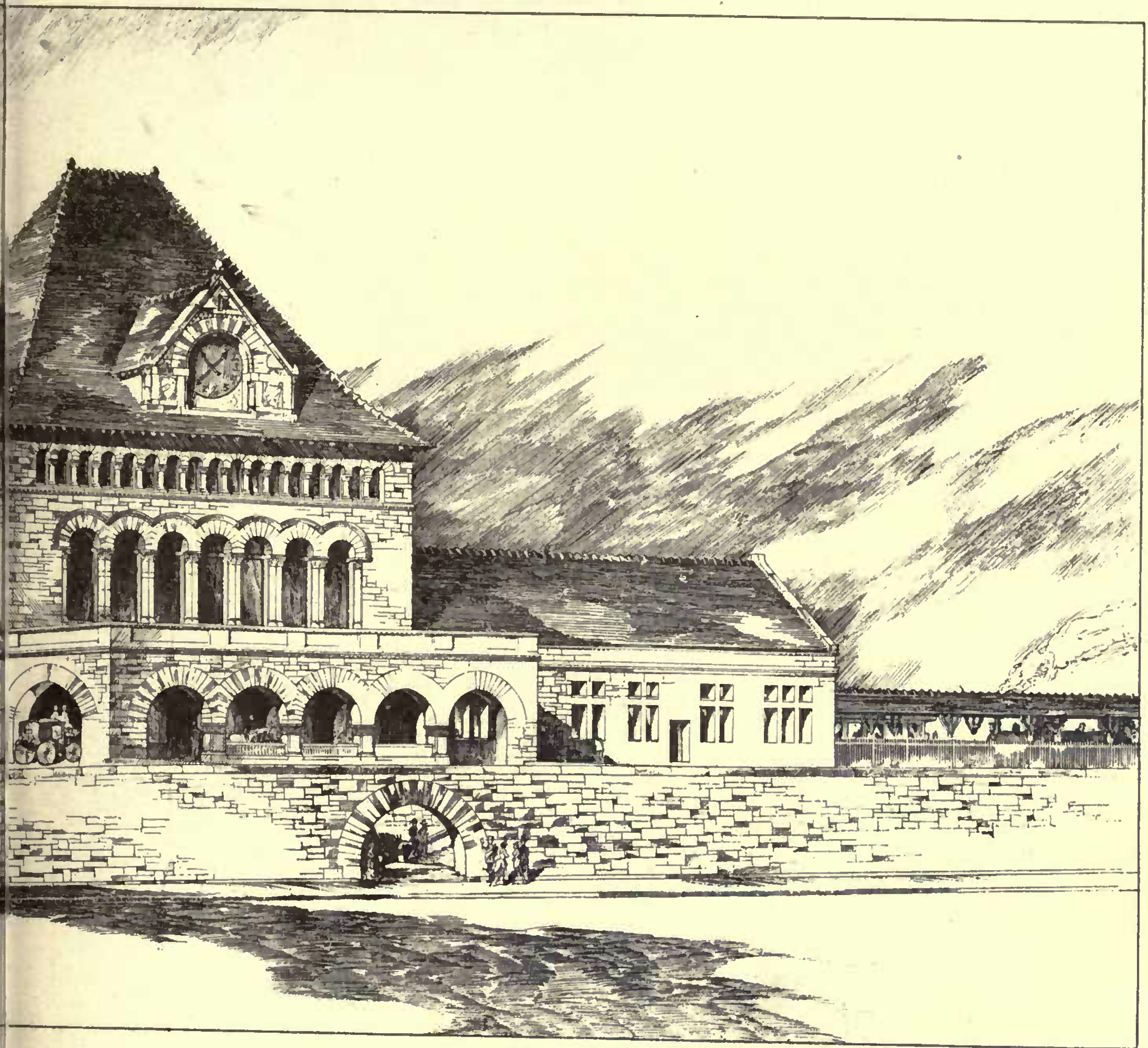


Heliotype Printing Co. Boston.

Copyright 188

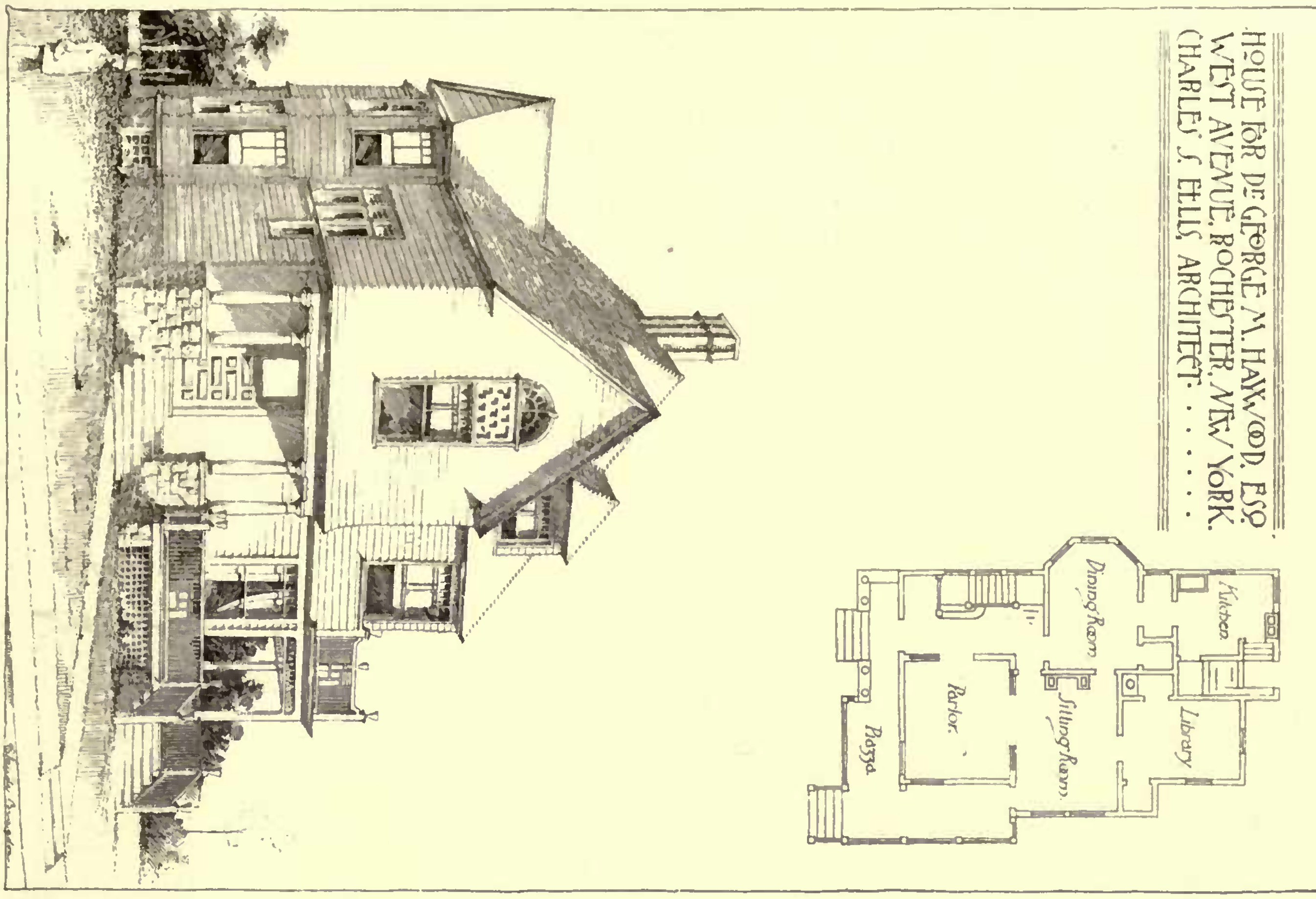


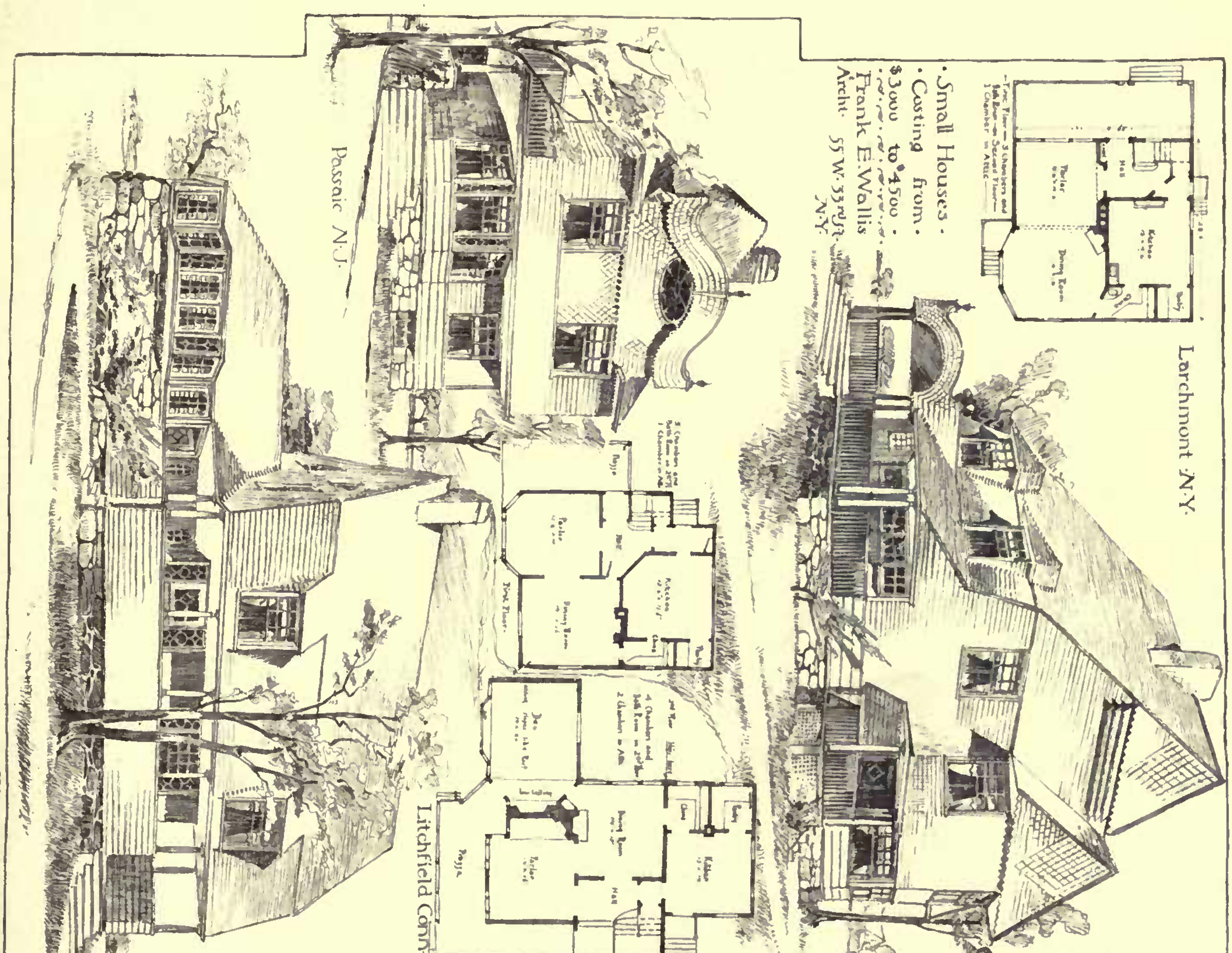
TICKNOR & Co



Heliotype Printing Co. Boston

COPYRIGHT 1888 BY TICKNOR & CO





[Mr. Morrill], on whom I look as a father of this great measure, had for years before been engaged in it. We have worked together from that day to this the best we knew how. It took us six years before we got a law through both branches of Congress. The law had all manner of attacks. In fact, there were a good many men, some in this body and perhaps some in the other, who did not want a shelter for the Library, possibly for the reason that they did not need books.

I do not remember that we had the support of the distinguished Senator from Kansas for the original proposition to have a Library at all, but be that as it may, when we passed the bill for the erection of a Library it was after the utmost care and consideration by a committee of five gentlemen from this body, and perhaps the same number from the other House. It was not done in haste, not done in a corner, but considering everything in connection with it, we thought it was best to intrust the construction of the Library building to a commission, to be composed of men who were well known, and must necessarily be men of high character.

I hope I may have the attention of the Senate, because the question turns upon this very point that I am stating. In the law which passed Congress and was signed by the President, it was provided that the construction of the building — which covers everything, covers the employment of skilled labor and of common labor, covers the question of purchasing materials, of contracts, and all cognate questions — should be committed to a commission consisting of the Secretary of the Interior, who, while the incumbent may change in that place, would naturally be supposed to be an honest man and was an honest man when this bill passed, two years ago. It will not do to say that the Secretary of the Interior then or now would connive at dishonest practices.

Then who was the next commissioner named to take charge of the construction of this great building? It was Mr. Spofford, the Librarian of Congress. I have known him almost thirty years. He was appointed here by Abraham Lincoln, and if the Senator from Kansas can convince the country and can convince the Senate that Mr. Spofford is an improper man to have charge of a work of this kind, and would allow improper charges and waste the public money, he will have more of a task, I think, than he has bargained for. The next man named on that commission was Edward Clark, the honored Architect of this Capitol. We have all known him a long time. I want to justify the action of the committee of which I am a member, and justify the two branches of Congress to everybody, except the Senator from Kansas. I despair of doing that to him. But we thought that these three men might safely be trusted with the expenditure of the public money upon a building of this kind.

Were we mistaken or not? I am not going into the intricacies of how much was paid for a watchman, a little more or a little less. There may have been one or two salaries paid that are too high here. I think perhaps in one instance a man is paid beyond the duties of his position, but that is a small matter and a matter of opinion. The three men composing the commission are men of high character. They have absolute control on this question and they have the employment of the architect. He has no power except as an architect employed to furnish designs, plans and specifications. He can not receive a bid; he cannot make a contract; he cannot judge of material even except subject to the commission, and it seems strange to me that a Senator rises here with a paper in his hands to pick out a little bit here and a little bit there and to expose expenditures that are necessary and that took place in the beginning of the work. All these expenditures, with every step in the progress of the work, have been under the charge of men whom you and I and every one of us would trust in any and every affair of private life.

What is more, I say if there has been malfeasance in office there, it would be a mostamazing thing to me, for these are among the most perfect men known here — the past and present Secretary of the Interior, Justice Lamar and Mr. Secretary Vilas. The Senator from Kansas, for the first time I ever heard it going into party politics, drags into this matter the Democratic party and the Republican party. We have never remembered that there were parties when discussing the Library bill. We have never remembered that there were parties in our Chamber when we have met in our committee-room and considered the question. But if that be a thing to be mentioned here, allow me to say, and I do it with the greatest possible respect, that two of these commissioners, Mr. Spofford and Mr. Clark, are pronounced, square, out-and-out Republicans, and I respect them as such, for I want no neutral tints in anybody's politics. So far as I am concerned, if a man belong to a party let him be there.

Here, then, are three commissioners; one of them, it happens for the time being, is of one party and two of the other party, but I care not a fig about that. I have divested myself largely of care on this subject because I have felt secure in the men in whose hands this whole business is confided. I have not felt that it was necessary for me to hunt up whether this dollar or that dollar was wrongfully spent because I felt that I could go to bed at night trustfully and confidently that matters would be right to-morrow morning, and if there are any discordant elements that creep in in connection with the construction of this building, I know the men who have the honor to compose the committee of the Senate desire to meet such questions with honesty, economy and candor, and push on the work on this building as rapidly as possible.

It is unfortunate that material was offered that was found not acceptable to the commission. We heard of no trouble until that question was raised, and if I desired to say any unkind thing, which I do not, to the Senator from Kansas (and he knows I do not), I would say that it was singular what a noise and trouble one discontented contractor can make, and if every time a man offers a bid which is not accepted such a racket as this can be raised, we may despair of ever having a Library.

Allow me to say a word further, Mr. President. This is a great work. I had occasion to talk a little the other day on this floor about it. I repeat myself when I say that it is 21,000 square feet a larger building than the State, War and Navy Department building. The law for the construction of that building was passed in 1872, nearly sixteen years ago, and it is just finished. The Bureaus of the War Office have just moved into it. This building, as I say, is 21,000 square feet larger. It is the largest building the Government will own except this Capitol, and it is more than two-thirds as large as the Capitol. It will be the largest Library building on the globe, and will be an honor to this country when it is erected.

I have devoted time, labor, thought, and enthusiasm to this question, and my greatest hope, in which I know my distinguished and beloved friend from Vermont [Mr. Morrill] joins me, is that we may live to see its spire reach the sky and see the books of this great Government housed in it, and the accumulations of the age added to it. When that shall be done, the small bickerings and fault-findings of the present hour will be forgotten in the joyous feat that has been accomplished.

I have no fears of the future. I believe this work is in the hands of honest men, and when I believe in a man's honesty I feel secure.

Mr. Plumb. — It will be news, I think, to the Librarian, Mr. Spofford, that he is a Republican, but in the mutations which are going on in the political world ——

Mr. Voorhees. — I care not whether he is or not; he is an honest man, appointed by Abraham Lincoln. I supposed he was a Republican and suppose so yet.

Mr. Plumb. — I have no doubt he is an honest man, but the Senator from Indiana is certainly not going to say that on account of any eminence of this Library Commission they are to be left to expend money at their will.

Mr. Voorhees. — Undoubtedly not. If you can make it appear that they have spent a dollar and a half apiece wrongfully, we will call them to account.

Mr. Plumb. — That is exactly what I am coming to. I propose to criticise, and I suppose the Senator will think it just that I should criticise ——

Mr. Voorhees. — I will call a meeting of the committee and ask the Senator to come before it to show wherein anything is wrong. This committee is not here to cover up wrong.

Mr. Plumb. — I think on the whole they have had something to do, as shown in their report, and I have a right to refer to what has been done under their auspices and control. The fact that they are eminent and honest men does not relieve me from my responsibility in regard to the expenditure of public money which I vote.

I have had nothing to say about any contract. The Senator from Indiana seems to have got it into his mind that there is some contract about which I am concerned. I do not know any contractor and do not know anything about any contractor in connection with this work. I simply spoke of expenditures not relating to any contracts, not relating to construction, and said they were of a kind which have been extravagant and almost, if not wholly and totally, unaccompanied by any result to the Government, and I so characterized them. If the Senator wants to commend the commission because they have dealt harshly with contractors, I have no objection; that is his business and not mine.

If I were conscious of a desire for a long life, I should join most heartily in the aspirations of the Senator from Indiana that I might live long enough to see the spire of the Library raised to the skies. I never expect to see it.

Mr. Hale. — Mr. President, now let us go back to the bill itself and have a vote on the amendment offered by the Senator from Ohio.

The Presiding Officer. — The question is on the amendment proposed by the Senator from Ohio [Mr. Payne].

ILLUSTRATIONS

[*Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.*]

HOUSE ON BERKELEY STREET, BOSTON, MASS. MESSRS. PEABODY & STEARNS, ARCHITECTS, BOSTON, MASS.

[Gelatine Print issued only with Gelatine and Imperial editions.]

HOUSE FOR DR. GEORGE M. HAYWOOD, ROCHESTER, N. Y. MR. C. S. ELLIS, ARCHITECT, ROCHESTER, N. Y.

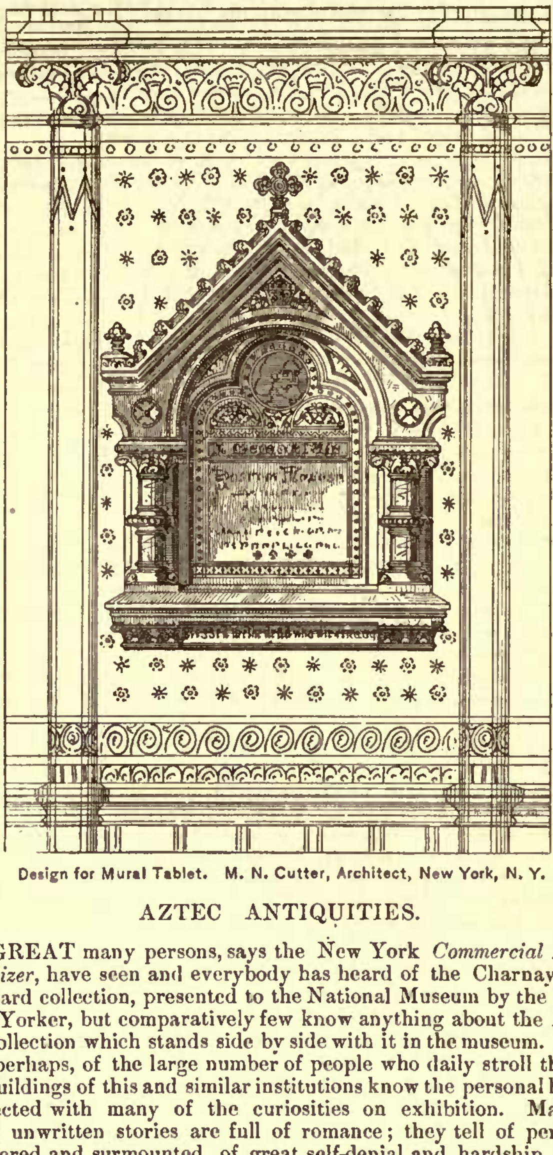
CHEAP HOUSES AT PASSAIC, N. J., LITCHFIELD, CONN., AND LARCHMONT, N. Y. MR. F. E. WALLIS, ARCHITECT, NEW YORK, N. Y.

THE finish of all of these houses is either pine or white wood, cherry stain. In house at Litchfield the "Den" fireplace is to be built of field boulders and with large opening; in other houses of fire-brick.

BOSTON & ALBANY RAILROAD STATION, SPRINGFIELD, MASS. MESSRS. SHEPLEY, RUTAN & COOLIDGE, ARCHITECTS, BOSTON, MASS.

COMPETITIVE DESIGN FOR A VILLAGE CLOCK-TOWER BY MR. T. WALSH, BOSTON, MASS.

To this design was awarded an honorable mention in the recent competition of the Architectural League of New York.



Design for Mural Tablet. M. N. Cutter, Architect, New York, N. Y.

AZTEC ANTIQUITIES.

A GREAT many persons, says the New York *Commercial Advertizer*, have seen and everybody has heard of the Charnay-Lorillard collection, presented to the National Museum by the liberal New Yorker, but comparatively few know anything about the Abadiano collection which stands side by side with it in the museum. Very few, perhaps, of the large number of people who daily stroll through the buildings of this and similar institutions know the personal history connected with many of the curiosities on exhibition. Many of these unwritten stories are full of romance; they tell of perils encountered and surmounted, of great self-denial and hardship, and of private fortunes spent for the furtherance of science.

There is now en route to this city a gentleman who has spent many years in the study of American antiquities. He was the projector of the Abadiano collection, which bears his name, and negotiations will be opened with General Di Cesnola, of the Metropolitan Museum, which may result in the casts being brought to New York. Wendell McLoughlin, of the Erie Railroad Company, accompanied Abadiano in his journey to the ruins and assisted in taking many of the casts. Mr. McLoughlin tells many interesting facts of the struggles of the young Mexican antiquarian. Referring to the collection recently, Mr. McLoughlin said:

"The casts are splendid specimens of art, and bring out the characters engraven on the original stone wonderfully well. Their value to history can hardly be over-estimated, for if anything more is ever to be learned of the Aztecs it will have to come through these voiceless monuments. The large collection of manuscripts were nearly all of them destroyed by the zealous priests who accompanied the Spanish conqueror, and thus the thread that bound an enlightened nation to the history of the world was ruthlessly snapped. The monuments narrowly escaped the fate of the manuscripts, and many of them show the marks left by axes in the hands of ignorant zealots nearly four hundred years ago. But they were, fortunately, for the most part saved, and it is to be hoped that a key to the hieroglyphics chiselled on them may yet be discovered, and thus a new and important link added to the chain of history."

"Is there any movement in that direction?"

"Yes, there is, but it is as yet in its infancy. Nothing can be done until all of the collections on the Continent and in this country are brought together, thus enabling the student to make an intelligent study of the subject and in time to discover the real theory. This is the idea of Abadiano, and he has the co-operation of many of the most prominent scientists of the day. He is an enthusiast on the subject, and has spent a great part of a handsome fortune in carrying it out. Mr. Lorillard is still interested and willing to continue to help, but the burden is too heavy to be borne by half a dozen."

"The story of the collection must be an interesting one, judging from the adventures of Désiré Charnay," was suggested.

"Not only interesting, but romantic," was the reply.

"The career of Abadiano, and the way in which he came to make the collection is curiously identified with the history of Mexico under Diaz. The dashing revolutionist and the young antiquarian were, strangely enough, intimate friends, and Abadiano was an officer in the Diaz army when the latter was striving to wrest the government from Lerdo — the rightful president. The two young men fought and slept and eat together, and when they had succeeded in their efforts and Diaz was proclaimed ruler, the young antiquarian retired from the army and returned to his home at the capital. Here his family had for more than two hundred years conducted a large book store and he, together with his brother, now took charge of it. But his antiquarian tastes and his service in the army had unfitted him for a business life and he soon withdrew from the firm. Diaz had promised him an appointment if the revolution succeeded, and he now asked for it; but the office offered him was so much smaller than he thought he had a right to expect that he would not except it. General Diaz then suggested that he make a collection of antiquities and agreed to pay all expenses. There was some delay about getting an appropriation and so impatient was Abadiano to begin that he advanced the money from his own purse. He put his whole soul in the work and determined to make the casts by the most approved method."

"Was it the same as that used by Charnay?"

"You would hardly need ask had you seen them side by side," answered Mr. McLoughlin. "The most unpractised eye can discern the difference. In the Abadiano cast you would notice that every little crack and crevice, even the grain of the stone, is brought out with the greatest distinctness. It was done by what is known as the gelatine process, and it is very expensive, especially in a country like Mexico, where the material is scarce and has to be bought in small quantities at the drug stores. The stone of which a cast had to be taken was first securely boxed and the hot gelatine poured into the vacant space between the box and stone. One can imagine the difficulty of making a cast when one takes into consideration a stone weighing twenty-five tons imbedded in the walls of a church, perhaps sixty feet from the ground, as was the famous calendar stone. A scaffold had first to be built, the high stone nicely divided and the cast made piece by piece."

"What was Charnay's method?"

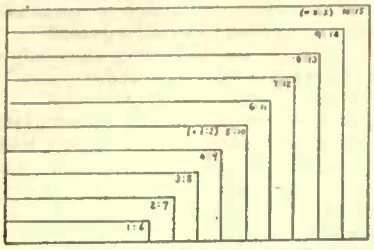
"It was a very simple one, and the most unlearned eye can see that it was very inferior to the more expensive one used by Abadiano. A piece of common brown paper was first dampened, then laid carefully over the stone and hammered until an impression of the characters was made. This was continued until the layer of paper was perhaps a quarter of an inch in thickness. Then it was left to dry and in time a cast made in plaster-of-Paris. Charney made many failures and was only partly successful in the end. His collection consists entirely of flat surfaces, such as friezes and medallions, while the more important monuments, the gods, the columns and statues, were left to Abadiano."

"How came Abadiano's collection to this country?"

"Abadiano's work was almost completed when a tide of misfortune suddenly overtook him. After he had made two casts and destroyed his gelatine plates, the Mexican government, in a spasm of reform, decided that the expense would be too great and declined to reimburse him. This was a terrible blow, but Abadiano decided to finish the work, hoping that his friendship with Diaz would make things all right. But they quarrelled, and he decided to carry the collection to the New Orleans Exposition, then just on the eve of opening. On arriving in New Orleans, he did not place his collections in the exposition, for he had been at great expense and this would bring him in no revenue. He rented a large store in the French quarter and there set up his casts. But so slowly did the careful antiquarian work that by the time he was ready to exhibit the exposition was nearly over and many of the visitors had left the city. At this juncture, Professor Mason, of the Museum, effected a temporary arrangement by which the collection was sent to Washington. If the Metropolitan Museum succeed in securing it, a most interesting feature will be added to the institution."

Pure Air Indicator. It is estimated that the air in a room becomes distinctly bad for health when its carbonic acid exceeds one part in 1,000. An apparatus has been recently patented by Prof. Wolpert, of Nurnberg, which affords a measure of the carbonic acid present. From a vessel containing a red liquid (soda solution with phenolphthalein) there comes every 100 seconds, through a siphon arrangement a red drop on a prepared white thread about a foot and a half long, and trickles down this. Behind the thread is a scale beginning with "pure air" up to 0.7 per 1,000 at the bottom, and ending above with "extremely bad" 4 to 7 per 1,000 and more. In pure air the drop continues red down to the bottom, but it loses its color by the action of carbonic acid, and the sooner the more there is of that gas present. –*Scientific American.*

PROPORTION IN ANGULAR, ROUND AND POINTED STYLES OF ARCHITECTURE.



Scale of Oblongs — (Parthenon Proportions)

TO those who have been observers of the world for their half century nothing is more impressive, it might almost be said oppressive, than the sense of its marvellously-increased populousness. "The full tide of human existence," which Dr. Johnson was familiar with at Charing Cross was visibly rising thirty years ago, but even then was moderate indeed compared with the high flood which now hurries and crowds along its thoroughfares widened as they are. The business and even ordinary occupations of men have undergone like cumulative complication. Effects due to such vast changes are necessarily traceable in the architecture of our day. Whatever public functions have to be provided with house-room, demand is made for vast space and combination of a multitude of subsidiary conveniences. The Law Courts may perhaps be taken as an example of how these conditions appear to be inimical to concentrated composition.

The theory of composition as laid down by the teachers of a former age enjoined that the conspicuous limits of a complete design should be included if possible within the general outline of some simple geometrical form. Hence, in painting, that "principle of the pyramid" which controls the groups of Holy Families by so many of the greatest Italians — Leonardo, Fra Bartolommeo, Raphael, Titian. This particular principle is one of many which have been similarly applied both in Classic and Gothic architecture. The general principle is becoming, for the reason given, more difficult of application every day; the more reason is there for endeavoring to penetrate to the true and full capabilities in variation of the harmoniousness of associated geometrical forms in all styles of architecture. It seems not impossible to evolve from study of the simpler problems of the past some guidance which may be available in the more comprehensive problems of the present day. Such an inquiry is bound to take equal note of Grecian and Gothic style.

The most characteristic form of Greek architecture, which for the most part is Greek templar architecture, is the oblong or rectangle. The chief proportions employed apply to relative lengths of lines at right angles to each other; this is the case in the plan of the general stylobate, of the cella and its sub-divisions; the long horizontal line of the cornice on fronts and flanks are in like relation to each other and to the height of the order, and the axial lines of the columns form oblongs of various proportions as falling into comparison with the variable distances of interspacing. Hence it is that the harmonious effect of the Parthenon is effected by the interplay of proportions between lines for the most part at right angles to each other. Oblongs are employed which were taken by Ictinus, the architect, from an advancing sequence, gradually approaching an exact square, but from among the infinite number of these a scale is adopted, with many analogies to a musical scale, by selecting for employment only a few, and those not too close together on the one hand, nor on the other with such gaps between them as to lose the advantage of sense of connection and interdependence. The sense of unity is further combined with pleasing relief of variety by the employment of the same selected proportionate oblong, sometimes in plan, sometimes in elevation, and in different dimensions.

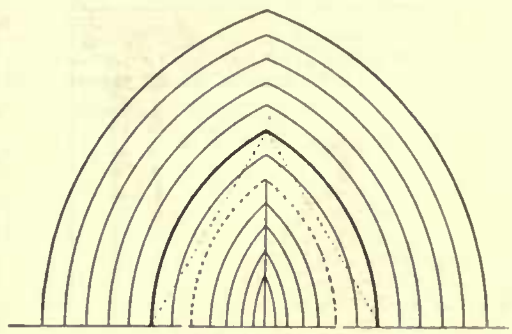
The oblong plan of the temple on the top step has exactly the proportion of breadth to length of 4 : 9, viz.: 101.341 front: 228.141 on flank (error 0.12). The same proportion is repeated in elevation in the well-marked definition of breadth of top step — the hundred attic feet — and the height from this step to the top of the horizontal cornice (error 0.0034). It will be observed that this is a case of continued proportion. The measurements are taken from Penrose's "*Athenian Architecture.*"

The proportions of the same oblong again apply with slightly different dimensions to the side walls of the interior of the naos, then again to the lower diameter of the column compared with columniation, that is, to the extent from centre to centre of adjacent columns, which decides the important principle of spacing.

Again, by a correspondence far too precise to be fortuitous, the interior plan of the naos which lodged the colossal chryselephantine statue of Athens is an oblong of the proportion of 9 : 14, and the same proportion corresponds exactly to the full height of the façade to its breadth, so that, in fact, the elevation of the temple might be drawn accurately to scale on the pavement of the naos and would occupy it exactly.

These are but a few examples of the fundamental principle which I have elsewhere elucidated in detail and shown to have been kept in mind by the architect of the Parthenon as positively as a musician keeps in mind the characteristic selection of notes which constitute the scale of the key in which he is composing. The architectural scale in this particular instance advances by consecutive differences of five. Important applications of proportion are all taken within the sequence: 1 : 6 — 2 : 7 — 3 : 8 — 4 : 9 — 5 : 10 — (=1 : 2) 6 : 11 — 7 : 12 — 6 : 13 — 9 : 14, etc., to the neglect of the infinity of ratios which might be inserted intermediately. That a true principle of architectural proportion is here involved may be confidently assumed from the fact that it can be traced in all the finest works of the Greeks of which we have accurate measurements and always with the result of a pleasing or a majestic harmonious effect.

But Greek architecture is not the only fine architecture in the world, and proportion has its value in all styles. The principle, therefore, is required to vindicate itself by proved applicability to other styles however contrasted with the Greek. It should be applicable therefore to Gothic. It may or may not be possible to prove that the Gothic architects deliberately worked by guidance of such a principle, but wherever a conspicuously harmonious effect of proportion has been achieved by them, it ought to come out under analysis that this general principle has been contributory. This should be as positively the case and for the same reason as is the accurate proportion of the note which an untaught but naturally gifted singer pitches accurately by ear.



Scale of Pointed Arches.

The Greek theory then should be available for the Gothic architect — *mutatis* only *mutandis.*

The questions, however, are forced upon us: What are the *mutanda,* — and how are they to be verified as naturally and rationally *mutata?*

Certain forms of application do not seem to demand any change at all. Both styles have some elements in common and the regulative considerations are identical in both.

The plan of every cathedral is largely resolvable into a combination of rectangles,— squares or oblongs of various sizes, or of oblongs of various proportions. The nave and transepts of Westminster Abbey church with their aisles are thus made up. It will be seen at once, how much effect is dependent upon the proportions adopted for relative breadth and length in both nave and transept. How great a variety of effects was open to choice becomes apparent at once, by comparison of plans of various cathedrals. In these structures where the interiors were all important, we should expect the proportional norm to be decided by internal lengths and breadths. The greater or less elongation of the nave, the more or less liberal expansion of the crossing, the relative width allowed to a side aisle, all these are matters of proportion whether the designer trusts to his eye entirely and general impressions, or merely works out the conditions of the area and resources at command, or cares to proceed on the principle of reducing the approximate forms which commend themselves to his taste, to precise agreement with systematic numerical proportions. It cannot be indifferent to ultimate effect whether the vaulting of the aisles follows a series of squares as at Winchester, or of oblongs as at Westminster; nor when the oblong is admitted, in what degree it diverges from the square. So it will be observed that these oblongs have a narrower proportion in the aisles of the nave of the abbey, but a more compact in the broader transept. Mere sympathetic sense of appropriateness may have dictated this difference so conducive to harmonious variety; but we have only now to remark that it is one of those which the Greek regulated by precise numerical proportion,— as in the case of the breadths of the ambulatory and the portico of a temple.

The same remark applies to combinations of the three dimensions, height, length and breadth. Who has not found some interiors too low for the length or too high for the width? Those who would see the interior of Amiens Cathedral to the best effect, must divide the height for the eye by ascending to the triforium; there the clerestory windows are no longer hopelessly foreshortened and every moulding tells, as the spectator looks with equal ease upward and downward and to the front. The greatest of Greek architects combined the three dimensions in accordance with schemes of proportion which have much analogy to the numerical ratios of the notes of a musical chord,— though he was not restricted to the ratios which are determined for music by the laws of ærial vibration. Such exactness may not be indispensable in applied proportions, but proportion does not properly exist unless there is a certain approximation to exactness, be it only such as a cultivated eye decides spontaneously.

Other critical proportions in Gothic Architecture which have analogy to Greek, are the width sof nave and of pier arches relatively to height, of mass of piers relatively to interval, and the relative heights allowed to the subdivisions of clerestory and triforium. These latter are determined at Westminster Abbey with a numerical exactness which approaches that which the Greek applied to columns, hypostylic and epistylic. Architectural effect varies importantly with every variation of these and with every variation which is made in those which are associated with each other.

But new resources of harmonious combinations and variations arise when the restriction to right-lines and right-angles in the most important places is renounced, and curves of considerable sweep admitted and that in conspicuous positions.

The most familiar employment of the semicircle is in the arch; all semicircles have in themselves the same simple proportion of diameter to radius — of breadth to height, but taken in combination great variety has been obtained by differences of dimensions as dependent on the width of the openings which they crown, as between tall or broad windows, doorways or pier-arches. We have at one extreme an opening where the semi-diameter which measures the height of the arch may be only a third, fourth or fifth of that of the opening below, and in the other we have examples of wide span where the semi-diameter of the semicircle approaches equality to the height of the supporting jambs below or exceeds it in any proportion. Romanesque architecture went far to exhaust all the varieties and contrasts of this form. The effects were put to proof of pier-arches of various proportions as more or less suitable in different scales of positive dimensions. These were relieved from time to time by contrast of tall and narrow arcadings; then pairs of arches were included under a single containing semicircle, or the arch was enriched by mouldings of sections plane or round in concentric semicircles varied in degree of closeness. Then slender arcading was reduced to mere relief upon wall-surface, and trial was made of the ornamental effect of interlacing arch-mouldings by taking each pillar successively as the centre of semicircles extending to the next adjacent on either side.

Finally, great resources of enrichment were obtained by combining a series of successively diminishing moulded semicircles upon slope lines or splays on the side of a pier or in the thickness of the wall.

Architectural ingenuity, invention, taste and imagination did their utmost to exhaust the combinations of which these elements are susceptible; sometimes accidents or exigencies of construction led to a novel arrangement; at other times construction was modified to enable an original independent caprice to have its opportunity. Each scheme of combination was tried sooner or later in various proportions quite as adventurously, and in various degrees of complexity and of diversified enrichment. Occasional and precarious variety was obtained by employing a segment less than half the circle; otherwise and with more success by more or less stilting the semicircular arch above columns. Still the inevitable sameness of the semicircle set rigid bounds to the passion for elaboration and novelty which had worked resolutely up to the limit. When this was felt to be finally reached, the same impulse carried imaginative art at a very few bounds beyond it. Constructive conveniences and advantages, sometimes enforced and sometimes suggested an incidental employment of the pointed arch. The sense of congruity had been too positively developed in the round-arch system for the random mixture of round and pointed not to offend. The superior capabilities of the pointed arch were also very soon recognized, and the revolution accelerated by all the attractiveness of novelty in a rapidly progressive age, was speedily completed.

These capabilities no doubt partly consist in a special expressiveness of an aspiring form appropriate to edifices dedicated to sacred ceremonies and devotion. It then has other inherent advantages. The proportions of a semicircle are invariable; but there is no limit to the varieties of proportion which may be given to the pointed arch. It trenches on whatever advantages the semicircle may possess by the angle at the apex being reduced within a merest fraction to obliteration; or this angle may be so acute that the width bears the most trifling proportion to the height of the arch. Between these limits variability is infinite, and the widest field was open from which the artist could select any number of special forms most suitable for the embodiment of the idea which he might be striving to turn to shape and endow with a local habitation and a name.

Much of the work of the designer in the new style was simple translation of old forms into the new.

A perfectly developed Romanesque church becomes developed Gothic, by changing the semicircular into pointed arches throughout.

But the simple application of this process brings to light at once the special excellence of the new form and opens up a wide and delightful field wherein architectural genius might disport and accordingly forthwith hastened to disport itself. A new spirit of life was infused into the suits of Romanesque mouldings. Each moulding of such a series which before only repeated the identical semicircular form in altered dimensions, now becomes one in a succession of forms which gradually advance in proportion of width to height. Especial emphasis might be given to some of these mouldings independently or from regard to bearing shafts below, either by section, mass or ornament, but still each would take its place in easy gradation with those above and below it. The outer lines ever approaching nearer and nearer to coalescence with a semicircle.

Pointed arches are thus susceptible of being arranged in regular sequence of acuteness, as oblongs of all possible proportions may be arranged in order as they successively approach nearer to coincidence with a square, as the musical notes producible on a monochord approach nearer and nearer to a repetition of a primary note in the octave. Such an intermediate series is, in each case, naturally infinite; but as the musician makes his selection of notes with reference to a key appropriate to his theme, so the Greek architect selected a limited number of proportions of oblongs suitable for his purpose, and obtained characteristic expression by employing these variously to the exclusion of others; and so it would be at least possible, and in principle reasonable and legitimate, for a Gothic architect to select certain typical forms of the pointed arch as a scale, and to aim at producing a characteristic and harmonious effect by restricting himself to these.

It is not the purpose of this paper to set forth that any particular Gothic building can be proved to have been set out with definite recognition of this principle. This may or may not have been. It is perhaps less likely that this can be proved, than it can be shown that in some cases of admirable result, the forms adopted do prove to fall in with it. Certainly, for example, it is impossible to linger in Westminster Abbey, and not be conscious of a remarkable harmony in the contrasts, as much as in the gradations of the forms of the arches. The very acute arches of the aisles are associated with the broader proportions of the main nave and yet with no effect of harshness, the transitions being relieved by the intermediate forms of pier arches, clerestory and subdivisions of the triforium. On the other hand at Salisbury, the defective arcuation of the triforium, strikes an unmistakable discord.

In the formation of all scales of proportion, whether of sounds, colors or forms, the primary consideration is the determination of a key. This in architecture may be imposed by circumstances, or where these are elastic, must be supplied by imagination prompted and stimulated by apprehension of the spirit of the theme in hand.

Let us suppose that the key adopted is the pointed arch based on the proportions of the equilateral triangle. The repetition of this everywhere only differing in dimensions in heads of windows, in doors and pier-arches, etc., could not but be monotonous. The diagram shows a scheme of forms progressive away from this key in both directions — to breadth and to acuteness. It would, at least, be possible to select from this series a sufficient variety of forms to suit the exigencies of composition, and at the same time favor coherent harmony. The pointed arch of which the height is equal to the span, and is somewhat taller than that which includes an equilateral triangle, is intermediate between the two classes which are in fundamental contrast, those of which the height is greater than the span and the others of which the span exceeds the height. They may be distinguished as the expanded and the acute.

As characteristic effect is always dependent on restriction of variety within special limits, it is consistent to infer that advantage in this respect, may be obtained by adhering in a given composition to one or other of these classes almost exclusively; then, to a certain limit of variety even within the selected class; and, again, by even insisting by emphatic repetition and with diversity of dimensions, upon a particular central form within the range of that selection.

The value and relief of contrast depends largely upon resort to it being only occasional inasmuch as surprise however mild, is an indispensable element of contrast; it will therefore be provided for by the employment, always subordinately but still not unconspicuously, of a few well-marked forms from the class, whether the expanded or the acute, which is not adopted in the first instance.

Apart from the stimulus of such secondary concords the pointed style may droop towards the tameness of the circular. The pedantic adherence throughout Cologne Cathedral to the pointed form derived from the equilateral triangle, contributes largely with other causes, to the monotony which so soon brings our interest to an end.

It will be observed that the adoption of the pointed arch and arch mouldings did not involve the renunciation of all the beauty which is obtainable from circular forms and sequences. A further source of contrast is obtainable from association of these in circular windows, foils and cusps.

W. Watkiss Lloyd.

BOOKS AND PAPERS.

The value of this new life of Terburg, or Ter Borch [1] as the author calls him (setting an excellent example to those who mis-name persons and places) consists in the new matter that the author has culled, owing to the discovery of some sketch-books of the painter. It was known that a descendant of Netscher had alluded to these albums; but it was by mere accident that they were found by M. Bredius a few years since. Being interested in the 1882 exhibition of works of art at Zwolle (Gerard's birth-place) M. Bredius met with a descendent of Ter Borch's, M. Zebinden, who offered to let him see all the family papers, a mass of drawings and documents. In 1883 M. Van Doornuick published a work giving the genealogy of the family, and the names and dates appertaining to the principal events connected with the Ter Borchs. Shortly after this, M. Zebinden died, and the albums and documents were sold in Amsterdam. But previously to this M. Michel went to Holland, and through the kindness of the auctioneer, M. Scheltema, was enabled to look through the entire collection.

Gerard's father was a painter, and during his travels in Italy was an indefatigable worker; but on his marriage he seems to have thought it prudent to succeed his father as tax-collector, which appears to

[1] "*Gerard Ter Borch, Les artistes célèbres,*" par M. Emile Michel, Rouam, Paris.

have been an hereditary office, as at his death he bequeathed it to his son Herman. But he worked at his art as well, and as he married three times and had twelve children, the combination of labor no doubt was satisfactory. Gerard the elder, was a prudent and good man, as we may gather from a letter to his son, when he was in England. "Dear child, I send you the lay figure, but without the pedestal, as it would make the box too heavy, and you can get one made cheaply where you are. Use the lay-figure more than you did here. [That is questionable advice.] Draw much, large compositions full of movement, and if you want to paint, choose modern subjects which take less time to do. [Wise this advice, considering the heroic and sacred style of the day.] Paint freshly that your colours may harmonize well. . . . Above all, serve God. Be honest and humble, be useful to all, and your work will go well. I send you your coat, your garters, some shoes and laces, a ribbon for your hat, six cravats, six handkerchiefs, and two caps. Take good care of your linen that nothing may be lost." Then follows advice about mending his clothes, a piece of cloth being enclosed for the purpose. "I also send you a case full of long brushes, quite new, two quires of paper, some black chalk, a collection of good colours and six pens like those used by Matham [a celebrated engraver]."

Gerard was the eldest son, and showing a taste for drawing, the father took pains with his education. Two of his younger brothers, Moses and Herman, and his sister Gesina likewise inherited the father's artistic tastes. Indeed, the latter's drawings, reproduced in M. Michel's book show more than a mere taste, they are masterly sketches. Gesina was also a musician and writer of verses, according to the fashion of the day. Her portrait, by herself, is that of a *piquante* little face, with a *nez retroussé* and a crowd of little curls encircling her head. Moses also was a clever sketcher, but with a craze for soldiering and getting a commission in the Dutch fleet, at that time sailing for the Thames, he was killed in sight of "*Harwick sur la Tamise*," which I presume the author has miswritten for Harwich. Moses's portrait by his sister is that of good-looking young fellow, with long hair and dressed in the elegant man-millinery of the period. One of Moses's sketches bearing the name of Jan Fabres, reveals to us the identity of a personage in several of Gerard's pictures, which was engraved by Bartsch as a portrait of Ter Borch, and placed by Charles Blanc at the head of his biography of the painter. The "Leçon de lecture" of the Salle Lacaze in the Louvre, by Terburg, and a drawing (also in the Louvre, No. 536) by Netscher, contain portraits of this same Jan Fabres. Gesina seems to have survived the rest of her family, for she was living in 1690. She never married. After having had many admirers without returning their passion, she became engaged to Hendrick Jordis, sentimentally carving upon a tree his initials, and "*Vive le cœur que mon cœur aime*," in French; but, unfortunately, soon after, the young man became suddenly insane, and thenceforward art became her only lover.

One of the sketches in M. Michel's book dated 1628, of the family at dinner, is almost too clever for a boy of eleven years of age, and it is scarcely credible that it was the work of Gerard at that time; but another sketch is, no doubt, authentic as it is inscribed, "My Gerard did this drawing from Nature at Zwolle, the 24th April, 1626." This was two years earlier; and if the "Family at Dinner" is really the child's work, it shows enormous progress in the time. Nothing came amiss to the boy; he sketched everything, soldiers, landscapes, ruins, sports on the ice; and perhaps it is in this, that he excels beyond his contemporaries. We ordinarily only know Ter Borch by his satin gowns and lutes and furred jackets; but M. Michel gives us some sketches of soldiers, and "La Rise," which show him in a new light. Indeed, his greatest work, the "Peace of Münster," proves him to be best of the Dutchmen, and much more than a mere painter of satin. Not only are the difficulties of composition wonderfully mastered in the "Peace of Münster," but the individuality of the different types of men and the various expressions of their faces, are marvellously rendered. Whether Ter Borch learned how to treat grays from Velasquez, we cannot tell; he travelled in Spain, but is is said during the absence of the Spanish master. However that may be, in delicate coloring and precision of touch there is a certain similarity between Ter Borch and Velasquez. His successors, Metsa, Dow, Mieris, and his pupil Netscher, are all his inferiors; alone of the Dutch school, de Hooch, can be compared to him as a colorist. That he was before all things a Dutchman, is to his credit; he painted what he saw, often, in its supreme ugliness; but both he and de Hooch were content with nature. Their imitators, on the contrary, idealized.

M. Michel traces the history of the "Music Lesson," in the Peel Collection of the National Gallery. He imagines it to be the one sold in 1760 at Amsterdam for 196 florins, in 1762 for 230 florins, and in 1765 for 990 florins.

Thence forward he gives its history thus:

1767, sale of Julienne collection.......................... 2,800 francs.
1772, duc de Choiseul sale ....3,600 "
1777, prince de Conti sale...................................4,800 "
1781, marquis de Pange sale........ ....5,855 "
1808, duc de Praslin sale...................................13,000 "
1812, de Sereville sale.....................................15,000 "
1825, prince de Galitzen sale. ....24,300 "
1826, bought by Sir R. Peel for 920 guineas, at the sale of de la Haute.

Gerard's drawings have often been confused with those of his father, his brothers, Moses and Herman, and his sister Gesina; but since the discovery of the family documents, it is now easy to distinguish between them. The Louvre possesses but one; but at Berlin and Brunswick are several. Two of his best pictures are in the London collection, the "Peace of Münster," presented by Sir Richard Wallace, and the "Music Lesson" of the Peel collection; but there is scarcely a gallery that does not possess several examples, more or less notable.

COMMUNICATIONS

ADVERTISING IN ARCHITECTURAL JOURNALS.

TORONTO, March 21, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,—In reference to your first article in the *American Architect* of March 17, perhaps I may remark for the encouragement of advertisers how important the advertisements that appear in your paper are to architects. I invariably look through them and if there is anything striking that I at any time am likely to require I have that advertisement cut out and stuck into a classified advertisement book that I keep for reference. In writing for particulars I always state that the advertisement appeared in the *American Architect*, but it is as you say almost impossible to do more by way of letting the advertiser know that his "ad" has been seen. I have sometimes wanted an article that has been advertised, but which advertisement is discontinued, and if it happens that it has not got into the advertisment reference-book there is no chance of looking it up. More than once I have had to do without an article because it was not advertised recently. One cannot expect an advertiser to go on putting in an advertisement on the chance of a single or very occasional order but I venture to submit that advertising in the *American Architect* does more good than harm, to say the very least.

Yours truly, ——— *Architect.*

DEAFENING FLOORS.

PHILADELPHIA, PA., March 17, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,—My attention has been called to the 131 page of Vol. XXI of the magazine, bearing your respected name as publishers, and I find there a note by the editors in answer to an inquiry, "H. C. B.," under date March 7, 1887, from Buffalo, N. Y., respecting *deafening wooden floors*. In this note the process described is spoken of as a well-known process much used—"in the so-called New York way"—"in the Boston way." I would thank you very much to let me know at your early convenience where and by whom this process is used or has been used, so that I may be able to make further inquiry respecting it, of those who have applied it in their own work and know something of its effectiveness and ease of application.

Do you know if this process is covered by any letters patent?

Yours truly, S. DAVIS PAGE.

[THERE is no patent, so far as we know, on this sort of plaster deafening, either on the New York method, of putting the mortar on boards cut-in between the floor-timbers, or the Boston plan, of putting the mortar over the under-floor boarding. Any New York or Boston plasterer would know something of the process. A still more recent device, which is said to be effectual, consists in laying slabs of porous terra-cotta, cut to fit, on billets nailed to the sides of beams. This would produce less dampness in a completed building than a mortar process.—EDS. AMERICAN ARCHITECT.]

A DRAUGHTY CHURCH.

MIDDLETON, CONN., March 8, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,—There is a church in this place where great annoyance is experienced by the attendants from a disagreeable draught, the cause of which seems impossible to determine. Can you refer us to any one who is considered an authority upon such matters, from whom we can obtain advice as to the source of the trouble and its remedy. An early reply we shall esteem a favor.

Respectfully yours, J. W. HUBBARD & CO.

[ANY good ventilating engineer, like Mr. Tudor or Mr. Mills, of Boston, Mr. Baldwin, of New York, or a dozen others can solve the problem satisfactorily. We should say, for a guess, that the draught complained of might come from some large window high up in the building. Even if the window is tight, the air, chilled by contact with the glass, will sweep downward over its surface, and continue descending until it reaches the people below, where it is felt as a cold current.—EDS. AMERICAN ARCHITECT.]

NOTES & CLIPPINGS

THE FORT OF GOLCONDA.—Golconda has an old, old history. Hyderabad, with all its years, and great population, and bloody history, is young in comparison with the dead city whose acropolis rises from the plain three miles in the distance, on our left. The blocks of black granite which lie scattered over the country here lose their individuality, and form a vast cone, on the apex of which stands the grim fort of old and rich Golconda. The fort is still surrounded by its crenellated stone wall, which is three miles in circumference. It has eighty-seven high bastions at the angles, on which are still the ancient Shahi guns, some of them with their breeches blown out, from service in half-forgotten wars. The bastions are built of solid blocks of granite, either cemented together or bound with iron clamps. Many of these blocks

are of immense size and weight. Their average thickness is from fifty to sixty feet. On the way up we passed many battlements. It was fort within fort. We saw many fragments of palace walls; decayed mansions, where fragments of the delicate jalousies told the story of former splendor and social elegance; and heavy guns which had grown rusty in their long silence and disuse. On our right we saw an immense piece of masonry — a chambered wall with granite substructures — the whole covering a catacomb of fabulous dimensions. Here lay the buried wealth of Golconda in the old times when the kings revelled in untold glory, and their very names were symbols of heroism and treasure throughout India. What this treasure consists of is not well known, but most probably it was in jewels and gold. They were buried somewhere in these far-down vaults, and only the king, with possibly his premier, knew its exact whereabouts. He had a diagram of the catacomb, and knew where to go with his diggers, who were probably blindfolded when in sight of the treasure. When treasure was taken out, the place was walled up again, that all trace of the locality might disappear. It is believed, according to the best information I could derive, that vast wealth is still stored here, which is at the service of the Nizam when his revenue from regular sources gets scanty. I noticed that there had been recent openings in the solid masonry, but could not tell whether they had been caused by making repairs or for outlets for the concealed treasure, and again walled up. The "mines of Golconda" are a pure myth. The diamonds and other precious stones discovered near Partecll Cuddapah were brought here for sale, and were readily purchased by the rulers and their wealthy court. They were cut and polished here, and were regarded as equally good with gold as permanent treasure of the realm. The burial of them for future emergency gave the popular impression of a mine. — *Rev. Dr. Hurst, in Harper's Magazine.*

Brick and Stone Bridges of Large Span. — Professor E. Dietrich, of Berlin, enumerates 57 bridges of brick or stone existing which have a span greater than 130 ft., and says that there are no others over that size. Of these 22 are highway and 22 railroad bridges, one carries a canal, and one an aqueduct. Of the 57 there are 27 in France, 13 in Italy, 10 in England, two each in Austria and Spain, and one each in Germany, Switzerland, and the United States. The American bridge has the largest span of all — It is the Cabin John Bridge, near Washington, which is a single arch of 237 ft. span. Of the 57 bridges only three others are over 200 ft. span; 10 are between 164 and 200 ft., and 43 between 131 and 164 feet. Fourteen of them were built before 1800; 22 between 1800 and 1860; 5 between 1860 and 1870; 6 between 1870 and 1880, and the remaining 10 since 1880. In 22 of these bridges the rise is between one-third and one-half the span; in 18 between one-third and one fourth; in 10 between one-fourth and one-fifth, and in 6 between one-fifth and one-eighth. One bridge, in Turin, Italy, has a still flatter arch, the rise being in the proportion of 1 : 8.18 to the span. — *Railroad and Engineering Journal.*

The Drainage of the Campagna. — It has long been known that remains of ancient drainage works exist at different points in the Campagna, but it is only of late years that it has been possible to examine in detail the system of their construction. During the building of the new forts which surround Rome deep trenches have been cut into the soil, and by these old drains have been exposed in many parts in sufficient numbers to throw light on the method followed by the designers of them. On this hint, and taking advantage of the excavations, further search has been made, and it is now clear that a great part of the Campagna was in the distant past made healthy by systems of local drainage. Each hill or bluff on which a house or village was built was intersected by a net-work of drains, that often rose above each other in two or three tiers, and finally either carried the water away to the nearest outfall or stored it for agricultural or domestic use. One of the most perfect examples of the latter form was discovered in a hill on which the fort outside the Porta Portese stands. At a short distance below the surface of this hill, which was once occupied by an important Roman villa, the workmen came across the upper tier of drains. A system of tunnels about four feet high and nearly two feet wide has been cut through the porous rock, the top being strengthened by pairs of large tiles meeting in the centre and forming a gable roof. All the galleries of this tier converge with a very gentle slope to a common outfall, which leads the collected water to a second tier, that spreads its passages through the rock a few feet lower. The outfall of this second tier differs from the first in being narrowed to a small gullet, which was closed by a sheet of lead some eighteen inches square pierced with numerous holes so as to act as a strainer. This sheet of lead was found *in situ*. The third tier of galleries, about forty feet from the surface, and cutting the hill in cross lines directly beneath the upper systems, differs from these in three respects. Its floor is perfectly level, it has no outfall for its water, and it has a far larger section, being six feet high and nearly three feet wide. It was designed to serve for the storage of the water flowing into it from the upper drains, and was like them connected with the surface by a perpendicular shaft up which the water could be raised. All the shafts were provided with steps in their walls, traces of which still remain, for the use of workmen employed in cleaning the drains. As soon as these drains had been cleared of the accumulated deposit of centuries, though it was then a dry summer season, the water began to flow again and the cistern soon filled. The drains still discharged, as well as when first built, their double function of sanitating the soil and providing a constant supply of water for the use of the villa that stood above. — *The National Review.*

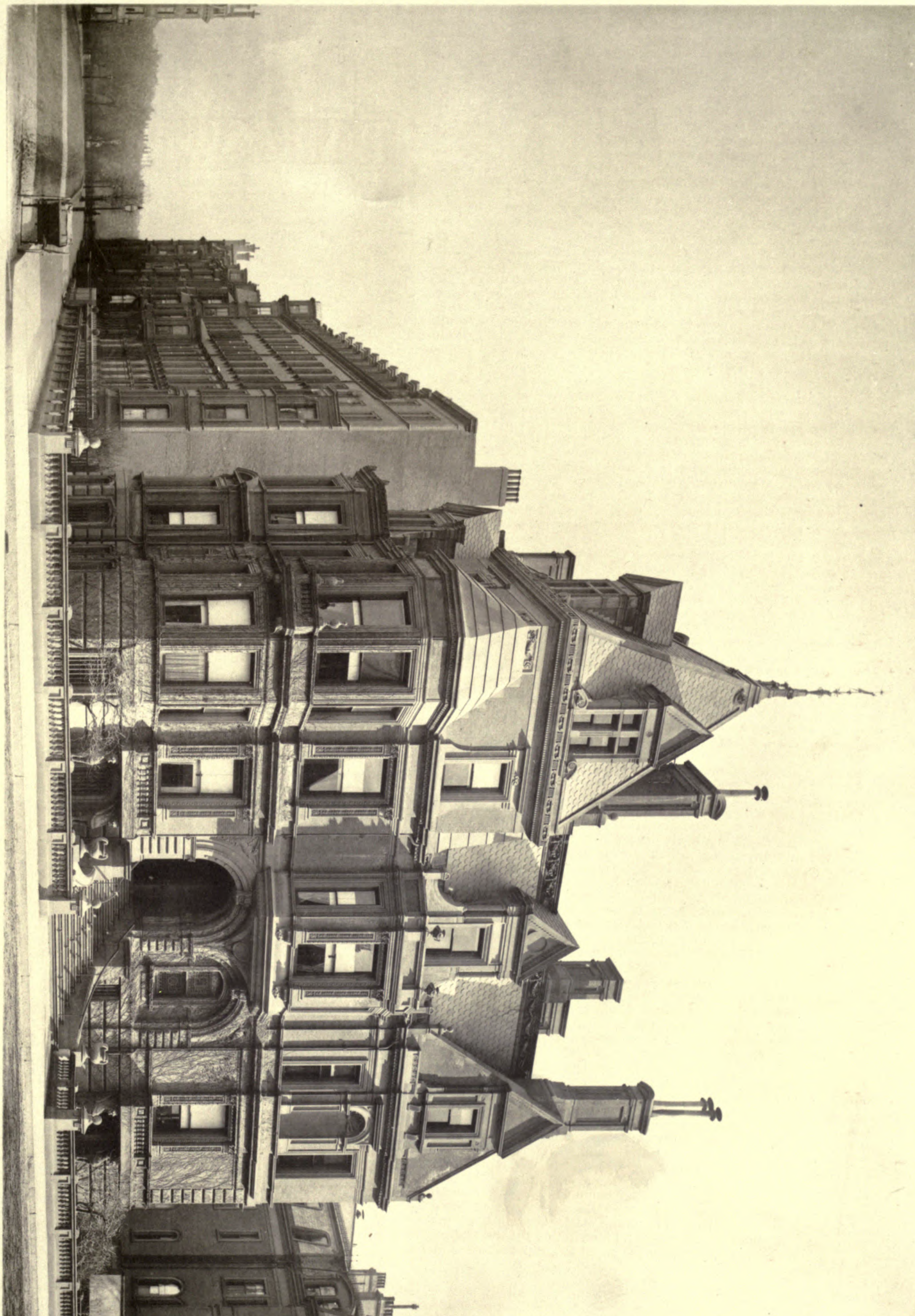
Value of a Walnut Log. — Curly walnut is highly valued by veneer makers, if it contain the right kind of figure. A curious story comes from West Virginia about a curly-walnut log. A woodsman found a tree somewhere in the region about Kanawha Falls, that he concluded was very valuable. He secured a sample and forwarded it to a handler of such wood in Baltimore. The result was that the discoverer received an offer for the tree, probably amounting to $2,000. Subsequently the Baltimore man sold a share of the chance to an Indianapolis dealer, who opened negotiations with the woodsman for possession of the prize, at length going to West Virginia to prosecute the enterprise. When the affair had reached this stage the woodsman concluded that the tree was worth $3,000, and demanded that sum for it, or he would not yield up his knowledge. Seeing that the Indianapolis man was bound to find the tree, if possible, the discoverer cut it down and buried it in the earth. A thorough search has, as yet, failed to reveal the hiding place of the log, and the man who holds the secret declares that nothing but $3,000 will bring it to the surface. — *Northwestern Lumberman.*

TRADE SURVEYS

Nothing short of personal contact with business interests or personal correspondence with intelligent and responsible authorities will enable the reviewer of markets and trade to know the actual conditions. The usual commercial signs signify very little just now. The reason is that this is what might be termed the incubating season for business. During the next thirty days perhaps sixty per cent of the volume of new business for this year will be practically determined upon. This business will not be shown in railway earnings, volume of exchanges, or in financial statements, or in any of the ways which commercial activity usually shows itself. Boston builders have already shown what they expect to do. New York architects and builders have shown that they have and expect to have about as much work this year as last, that activity in house and flat building has not been overdone, that suburban building activity will assume very large proportions, that railway-terminal facilities and rapid-transit facilities will probably be determined upon this year, but not in time to effect building interests, and that the vigorous growth that characterized manufacturing, commercial and building operations will be repeated this year. It is true less may be prosecuted than projected, but a conservative estimate as to probable construction gives the higher limit as the one to count on. Building operations in the territory within one hundred miles of New York city will be fully up to last year. The tendency is still to concentration with regard to manufacturing, storage and distributing facilities. Railroad work will be abundant. Low prices of iron, steel, lumber and building material will encourage the prosecution of several railroad building enterprises, such as terminal facilities at New York, Philadelphia, Staten Island, possibly, and additional facilities at several outlying points for the freer and cheaper handling of heavy freights. The Reading Company has about completed its real-estate purchases for the extension of its road from Ninth and Greene Streets to Twelfth and Market Streets, Philadelphia. The Pennsylvania Company will extend its station facilities at its present Filbert and Broad Street Station, probably doubling them. The same company is credited with the intention of enormous expenditures at and near Pittsburgh. It has orders out for one hundred and seventy-two engines and has schemes in hand for the improvement of its lines west of Pittsburgh. It is understood the Baltimore & Ohio management contemplates some very important improvements along its lines and branches as soon as it can disentangle itself from the errors of the previous presidential management. Other roads having Atlantic coast termini will also enter upon a policy of improvement and expansion which will reflect favorably on all industries that will in any way contribute supplies. Southern roads, it is ascertained, contemplate large additions of mileage and other improvements, which will help Southern industries identified with railway development. In fact, already large car-orders and orders for all kinds of railway material have been placed this month at Chattanooga, Rome, Anniston, Decatur and other industrial and manufacturing centres South. This rather extended reference is made to assured facts in order to dispel the notion entertained that railroad companies will be small and parsimonious buyers of material this year. The circumstances surrounding as much as forty thousand miles of American railway mileage compels liberal supplemental expenditures This source of demand will compensate for a falling off in new lines. In addition to this, mill and shop products will be in demand in many new directions. Pipe-lines, tunnels, elevated-road work, rapid-transit projects, elevator building, warehouse building, besides an extraordinary activity in manufacturing, and mining enterprises in the West and South will all help to swell the volume of work to be entered upon. From many quarters the replies made to inquiries show that house building will be of last year's magnitude in the aggregate. Builders have been agreeably surprised at the large number of absolute sales made and the evidences of a continuing demand The character of these cheap houses is improving year by year. Cheap plumbing and carpenter work is disappearing, and more attention is being given to good and enduring work. There is much house building work to be done in the States between Ohio and Minnesota. Lumber will be low; nails have reached cost, practically; all building material is at as low a price as it will probably reach, and builders and those employing them will make the best of these opportunities. Iron and steel makers anticipate a busy year. Machinery makers have work in sight up to early summer. Textile-goods manufacturers admit the market is beginning to absorb their productions more slowly. Stove manufacturers East complain that Western manufacturers have cheaper iron by a dollar or two per ton. Builders of heavy and special machinery predict greater activity in machinery. Agricultural-implement makers will not accumulate stocks further. Money-lenders are still quite anxious to loan on good Western securities. In the Southern States investments are generally made in person or by proxy rather than to loan money. Large timber tracts are being picked up. Desirable mining lands near railroads and streams which can be used to reach railroads are rapidly passing out of first into second and third hands to be held for future advances. Western shop capacity is on the increase and machinery makers in the New England and Middle States have a large amount of shop-equipment business under contract. The production of anthracite coal is just equal to the output at this time last year. The iron output is twenty per cent less. Logging operations in the Northwest point to a ten per cent deficit, which will probably disappear when returns are all in. Southern lumber manufacturers are all striving to enlarge their production in anticipation of dividing the Northern markets with the Michigan lumber interests, in part, at least. Tariff agitations continue to check the easy and natural development of business, but the heavy consumption in progress and the preparations for its increase gives a strong undertone to business and leaves business men confident that there are no worse evils in store for them than lower prices, narrower margins and longer credits. This tendency will exhaust itself soon because of the natural expansion going on which will develop a better demand for money-products and labor and open still wider fields for enterprise.

S. J. Parkhill & Co., Printers, Boston.

Copyright, 1888, by TICKNOR & Co.



HOUSE ON BERKELEY STREET, BOSTON, MASS.
PEABODY & STEARNS, Architects.

HELIOTYPE PRINTING CO. BOSTON

THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. XXIII. Copyright, 1888, by TICKNOR & COMPANY, Boston, Mass. No. 641.

APRIL 7, 1888.

Entered at the Post-Office at Boston as second-class matter.

CONTENTS

THERE is something interesting in the way in which Americans take up the idea of sharing the profits of manufacturing among the operatives in the factory, which has now attained a wide-spread popularity here. American manufacturers are almost always men who have themselves been operatives, and they reason with their employés in an unassuming, sensible way which is often very instructive. Among others, the Springfield Foundry Company of Massachusetts has just paid a dividend of two and one-half per cent as an addition to the wages earned by each man who has been with the Company during the year. Although this amounts to a present of twenty dollars or so to each person employed, at a season when such extra income is particularly acceptable, the directors of the Company, in their circular announcing the dividend, rather apologize for its smallness, and, while acknowledging the disposition shown by most of the men to do their part in earning it, express the hope that another year's business will show a better result, and point out the most effective way to accomplish this. In their judgment the most serious drain upon the surplus profits which might be used for paying dividends comes from the carelessness of moulders and others, who needlessly turn out defective castings. In every foundry there is a certain amount of loss from this cause, but we imagine that the Springfield Company's men will be rather surprised to learn that the cost of making good their own careless work amounted during the past year to twice as much as the dividend; and that if they had all done their work as well as they could, their share of profits, without any extra hours of labor, or any extra exertion beyond a little care, would have averaged sixty dollars in place of twenty. This difference will seem to the dullest workman well worth saving another year, and the Company's circular reinforces the moral by pointing out that the loss on an imperfect casting is sometimes as great as the profit on a good one; so that if a man loses a casting which takes one hour to mould, he must work his best all the rest of the day barely to cover the loss from his careless hour, without earning anything as profit for that day, either for himself or his employers. This, it seems to us, is very well put, presenting the lesson that profit in business depends on constant care and economy in the smallest details in a forcible and simple way. The circular closes by reminding the men that they have a personal interest in the business; that every minute of time and every cent's worth of property saved increases their profits; and that every pound of poor and rough casting injures the reputation and business of the foundry, while every pound of good casting helps both, and increases the present and prospective profits of the workmen.

"THERMUS," the clever expert correspondent of the *Engineering and Building Record*, describes in a recent number a hot-water heating apparatus which he has applied to a small city house with very satisfactory results. The house in question was originally provided with one of those feeble contrivances, the "Baltimore heater," which, as readers in places where house-warming is scientifically carried on may need to know, consists of a sort of flat stove set in an ordinary fireplace and having a smoke-pipe led up the flue, around which a certain amount of partially-warmed air struggles up into the rooms above. Finding it inconvenient to be obliged to wear his overcoat at breakfast in cold weather, to say nothing of the objections to leaving his family to shiver all day in a half-warmed house, "Thermus" bought a No. 22 Hitchings base-burning greenhouse boiler and set it in the corner of his dining-room, which, as is common in New York houses, is the front basement room. From the connections provided on the boiler, he then carried a line of flow and return pipes, supplying four Bundy hot-water radiators, two of which were placed in the entrance hall, while the other two were set near the windows in the front and rear first-story rooms. A small expansion-tank was connected with the upper end of the loop of pipe and the apparatus was then complete, and it has continued to warm the house comfortably in the coldest weather, with a consumption of less than fifty pounds of coal per day, and a maximum temperature of one hundred and fifty degrees in the flow-pipe, as measured by the thermometer inserted for the purpose. Owing, no doubt, to the liberal provision of heating-surface in the first-story hall, the chambers in the second story are sufficiently warm without any radiators specially devoted to them, and as the apparatus runs day and night, the house does not get chilled. As compared with the old heater, which, with a consumption of coal more than fifty per cent greater, failed to warm even the room in which it stood, this simple hot-water system seems to have been very successful, and while commending "Thermus's" letter, which is to be found in the issue of the *Engineering and Building Record* for January 7th, to the attention of persons interested in the subject, we feel ourselves moved to say a little on our own account in regard to what is certainly fast becoming the most popular mode of house-heating.

HAVING ourselves used a No. 22 Hitchings base-burner boiler for several years, we can confirm all that "Thermus" says of its virtues. Small as it is, the whole affair being only twenty-one inches in diameter, and forty-two inches high, fire can be kept in it continuously for almost any length of time. With our own boiler, which, however, has a comparatively small duty to perform, the consumption of coal does not average more than twenty-five pounds a day, and, in all but the coldest weather, one supply of coal in twenty-four hours, with a corresponding shaking out and removal of ashes, is sufficient to keep an equable heat all through the hot-water system day and night; and with good coal we have kept fire continuously from October to April. The freedom of the fire in this, as in other hot-water boilers, from the variations and uncertainties to which small hard-coal fires are ordinarily subject, is probably due to the conservative influence of the large body of water circulating around the fire-pot, which tends powerfully to maintain the coal at an equal temperature, and to protect it from the sudden chills which would extinguish a similar fire in an ordinary stove. Whether the excellence of the results to be obtained with the boilers is, however, all that is necessary to prove the superiority of hot-water heating, is doubtful. In the house which "Thermus" describes, the cost of the apparatus for warming three rooms and the hall, is set down as one hundred and seventy-five dollars, as a minimum, and as all the heating is by direct radiation, no fresh-air is admitted unless the windows are opened. Now, according to the plan given in "Thermus's" letter, there would be no difficulty in setting in the basement a small furnace, which, at no greater first cost, would warm all the rooms now warmed by the hot-water, and probably the second story bath-room in addition, and, besides heat, would supply fresh-air. Whether the expense of operating the furnace would be as small as that of the hot-water boiler is very doubtful, but fresh-air is a luxury, to be paid for like other luxuries, and a good furnace will supply it as cheaply as any apparatus in common use. Moreover, there is an unpleasant possibility that the hot-water pipes, if the house should be left to itself for a day or two, may freeze, and either they

or the boiler will burst in consequence, the result in either case being a long bill for repairs, and a house uninhabitable for a time. Having ourselves had this experience, we can speak with confidence upon the point, and on this, as well as other grounds, we may say that, for small houses, several improvements in the application of hot-water heating are needed, before the system can compete successfully with that which employs a hot-air furnace. One of the most important improvements yet to be made should lie in the reduction of the cost of radiators. In "Thermus's" house the four radiators are valued at fifty-six dollars, or forty cents per square foot of surface. This, although moderate in comparison with the prices once charged, is, in our opinion, about twice what it should be. Cast-iron pipe, such as is used for greenhouse heating, pays a large profit at twenty cents per square foot of radiating-surface, and there seems to be no reason why buckled plates, or some simple form of cast-iron radiator, should not be made at as low a rate. Moreover, to compete successfully with furnace-heating, hot-water radiators for dwellings ought to be made to take in a fresh-air supply from out-of-doors, on the direct-indirect plan, and deliver it warmed into the room. There ought to be no serious difficulty in designing simple radiators of this sort, which would do more to solve the problem of convenient house-heating, than anything yet devised. The next thing would be to compound some solution which could be used instead of pure water in the heating system, and which would not freeze so as to burst the pipes or boiler under any circumstances. The well-known hot-water car-heaters use strong brine instead of water. This has the advantage of obviating danger from frost, as well as the incidental one of raising slightly the maximum temperature of the radiating surfaces; but it has the great disadvantage of corroding the pipes, and the house-building world still awaits the mixture which will offer the advantages of brine, without its defects. When this comes, together with the inexpensive radiator which will take in a six-inch stream of air at zero from the outside of the house, and deliver it at ninety degrees into the room, and Mr. Fletcher's boiler, which, by the aid of copper pegs driven through the bottom, presents an efficiency several times as great as that of the old kind, we may expect to see hot-water apparatus supersede furnaces in small houses, as it already has to a considerable extent in large ones.

ANOTHER very fatal theatre fire occurred a few days ago in Portugal, where the Banquet Theatre at Oporto took fire on the stage, and was destroyed, about a hundred persons being either suffocated by the smoke and gas, or crushed in the struggle to escape. The cause of the fire is thought to have been a leakage of gas from a pipe under the stage, by which enough gas was accumulated to form an inflammable mixture with the air; and in the midst of the performance a violent explosion took place, extinguishing most of the lights in the theatre, and scattering fire in all directions. As usual, the persons nearest the doors escaped, but those behind them, in their eagerness to get out, barricaded the exits, so that they were crushed, while they prevented others from escaping. The occupants of the upper tiers of boxes, seeing the impossibility of reaching the doors, jumped from the windows, saving their lives at the cost of bruises and broken limbs. The stage exits seem to have been in unusually good condition, and the performers were mostly saved. If the year should go on as it has begun, the season of 1887–88 will long be famous for theatre fatalities. For several years the disasters at Nice and Vienna were the only very notable ones occurring in Europe, but since the present theatrical season began we have had three very serious and fatal conflagrations, at Exeter, Paris and Oporto, with some months remaining for further catastrophes.

ANOTHER sad accident occurred in New York recently, where a handsome apartment-house on one of the best streets in the city and reputed to be nearly fireproof took fire in the third story in some mysterious way, and the flames running up the elevator-shaft soon set the upper stories in a blaze. The first and fourth floors were vacant, and the occupants of the second and third stories escaped, although with difficulty, as the halls were filled with smoke, but the fifth story was cut off by the dense smoke in the halls and the appearance of fire about the staircase before the alarm could be given. This story was occupied by a lady named Westlake, with her daughter and two young sons and an old servant. There were no fire-escapes on the building, and, waking to find their retreat by the stairs intercepted, they could do nothing but stand at the windows imploring help from the passers-by. An engine was quickly brought, but a stream from a hose was useless for saving life, and while a message was despatched for long ladders the foreman of the engine company undertook to reach the prisoners with a short scaling ladder. He managed to climb to the fifth story, followed by two or three other men, who waited at the third floor for his return. The brave fireman took one of the Westlake boys in his arms and climbed down with him to the fourth story, when he was overpowered by a rush of dense smoke from the windows and lost his hold of the ladder. His men below, seeing him about to fall, spread a life-net to catch him, and he and the child both fell into it, but rebounded from it to the pavement and were both severely injured. The firemen who had been waiting in the third story then jumped from the windows into the net and escaped unhurt. The remaining son and the daughter next tried this forlorn chance for their lives. The young lady dropped first from the window-sill to which she had been clinging, but struck a ladder before reaching the net, and was so badly injured that she died almost immediately. The boy, perhaps more fortunate, reached the net, but fell out again and was severely bruised on the stones. By this time the long ladders arrived and were quickly set up for the rescue of the mother, who was seen partly hanging out of a window. Before the firemen could reach her, however, she fell to the pavement and was picked up dead, suffocation by smoke having, however, been nearly complete before her fall.

THE architectural world is looking out rather anxiously for the announcement of the great competition for designs for the Palace of Congress at Buenos Ayres. Some time ago the Argentine Government appropriated six million dollars for the construction of this building, and a semi-official announcement was made that architects would be invited to submit designs in competition, but so far no formal publication of the terms has been made. It is understood, however, that eight months from the official announcement will be allowed for the completion of the designs and delivery at Buenos Ayres; or forty days less, if competitors prefer to deliver them at the nearest Argentine embassy. The jury is to be composed of the Presidents of the two Chambers, the Director and Vice-Director of the Department of Civil Engineering, the chief magistrate of the city of Buenos Ayres, and ten other members, to be appointed by the President, of whom five are to be architects. Six prizes are offered. The first prize is twenty thousand dollars, but five thousand of this will be retained until the author of the plan so honored has executed and delivered the working drawings of the building. The second prize is eight thousand dollars, the third, four thousand; and there are three inferior prizes, of two thousand dollars each.

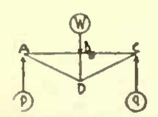
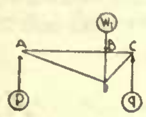
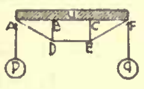
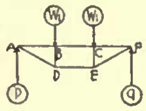
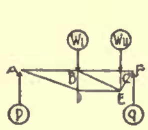
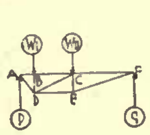
IT seems rather curious to hear the name of Leonardo da Vinci invoked as the inventor of the device by which the Panama Canal is to be carried to completion, and made available for use, but there is no doubt that this great artist was the originator of the system of locks with movable gates now in use on nearly all canals and canalized rivers, and to this system the Panama Canal is now to be adapted. Although the change or the original scheme of a sea-level cutting to one including several locks was officially considered a year or more ago, it was only formally adopted this winter, yet such rapid progress has been made with the application of the lock system that contracts have already been entered into with M. Eiffel, the great engineer-builder, for the construction of the gates and other apparatus for eight enormous locks, all of the same pattern, by which vessels will be lifted from the Atlantic to the heights of the Culebra, and let down again to the Pacific. The gates, which form the most important part of the lock, are to be of iron, sliding in a groove, and the water is to be introduced and withdrawn from the lock by means of huge pipes, nine feet in diameter, which will pour ten million gallons of water into the lock basin in fifteen minutes.

SAFE BUILDING.—XXIV.[1]

STRENGTH is frequently added to a girder or beam by trussing it, as shown in Table XVIII. One or two struts are placed against the lower (or upper) edge of a beam and a rod passed over them and secured to each end of the beam; by stretching this rod the beam becomes the compression chord of a truss and also a continuous girder running over one or two supports. There must therefore be enough material in the beam to stand the compression, and *in addition* to this enough to stand the transverse strains on the continuous girder. If the loads are concen-

Trussed Beams.

TABLE XVIII.
TRUSSED BEAMS.

Illustrations.	Description.	Compression in Struts.	Compression in Beam.	Tension in Rods.	Amount of Reactions.
	*Trussed Beam* with one centre load $= w$ $AB = BC$	*Compression in* $BD = +w$	*Compression in* $AB = +\frac{w}{2} \cdot \frac{AB}{BD}$ *Compression in* BC same as in AB	*Tension in* $AD = -\frac{w}{2} \cdot \frac{AD}{BD}$ *Tension in* CD same as in AD	$p = \frac{w}{2}$ $q = \frac{w}{2}$
	*Trussed Beam* with one load $= w_i$ (not central,) at any point $AB \lessgtr BC$	*Compression in* $BD = +w_i$	*Compression in* $AB = +p \cdot \frac{AB}{BD}$ *Compression in* BC same as in AB, or $= +q \cdot \frac{BC}{BD}$	*Tension in* $AD = -p \cdot \frac{AD}{BD}$ *Tension in* $CD = -q \cdot \frac{CD}{BD}$	$p = w_i \cdot \frac{BC}{AC}$ $q = w_i \cdot \frac{AB}{AC}$
	Trussed Beam with uniform load $= u$ and one central strut. $AB = BC$	*Compression in* $BD = +\frac{5}{8} \cdot u$	*Compression in* $AB = +\frac{5}{16} \cdot u \cdot \frac{AB}{BD}$ *Compression in* BC same as in AB	*Tension in* $AD = -\frac{5}{16} \cdot u \cdot \frac{AD}{BD}$ *Tension in* CD same as in AD	$p = \frac{u}{2}$ $q = \frac{u}{2}$
	*Trussed Beam* with uniform load $= u$ and two struts, dividing beam into three equal parts. $AB = BC = CF$	*Compression in* $BD = +\frac{11}{30} \cdot u$ *Compression in* CE same as in BD	*Compression in* $AB = +\frac{11}{30} \cdot u \cdot \frac{AB}{BD}$ *Compression in* BC *and Compression in* CF same as in AB	*Tension in* $AD = -\frac{11}{30} \cdot u \cdot \frac{AD}{BD}$ *Tension in* DE = — compression in AB *Tension in* FE same as in AD	$p = \frac{u}{2}$ $q = \frac{u}{2}$
	*Trussed Beam* with two equal loads each $= w_i$ and two struts at equal distances from ends. $AB = CF$	*Compression in* $BD = +w_i$ *Compression in* CE same as in BD	*Compression in* $AB = +w_i \cdot \frac{AB}{BD}$ *Compression in* BC *and Compression in* CF same as in AB	*Tension in* $AD = -w_i \cdot \frac{AD}{BD}$ *Tension in* DE = — compression in AB *Tension in* FE same as in AD	$p = w_i$ $q = w_i$
	*Trussed Beam* with two unequal loads w_i and w_{ii} at any points. Providing p smaller than w_i and q larger than w_{ii}	*Compression in* $BD = +p$ *Compression in* $BE = +(q - w_{ii}) \cdot \frac{BE}{BD}$ *Compression in* $CE = +w_{ii}$	*Compression in* $AB = +p \cdot \frac{AB}{BD}$ *Compression in* BC same as in CF *Compression in* $CF = +q \cdot \frac{CF}{BD}$	*Tension in* $AD = -p \cdot \frac{AD}{BD}$ *Tension in* DE = — compression in AB *Tension in* $FE = -q \cdot \frac{FE}{BD}$	$p = \frac{w_i \cdot BF + w_{ii} \cdot CF}{AF}$ $q = \frac{w_i \cdot AB + w_{ii} \cdot AC}{AF}$
	*Trussed Beam* with two unequal loads w_i and w_{ii} at any points. Providing p larger than w_i and q smaller than w_{ii}	*Compression in* $BD = +w_i$ *Compression in* $CD = +(p - w_i) \cdot \frac{CD}{BD}$ *Compression in* $CE = +q$	*Compression in* $AB = +p \cdot \frac{AB}{BD}$ *Compression in* BC same as in AB *Compression in* $CF = +q \cdot \frac{CF}{BD}$	*Tension in* $AD = -p \cdot \frac{AD}{BD}$ *Tension in* DE = — compression in CF *Tension in* $FE = -q \cdot \frac{FE}{BD}$	$p = \frac{w_i \cdot BF + w_{ii} \cdot CF}{AF}$ $q = \frac{w_i \cdot AB + w_{ii} \cdot AC}{AF}$

Where $p =$ the amount of the left reaction, in pounds.
" $q =$ the amount of right reaction, in pounds.
" $w, w_i, w_{ii} =$ concentrated loads, in pounds.
" $u =$ uniform load, in pounds, over whole beam.
" $AB, BC, CF, BD, BE, CD, CE, AD, DE, FE =$ the length of *longitudinal central* axes of these pieces, and must *all* be expressed *uniformily*, that is *all* expressed either in feet or inches.

The amounts of compression in either struts or beam — parts will be the total compression in each, expressed in pounds; to obtain the compression *per square inch*, divide the amount by the area of cross-section of the strut or part.

The amounts of tension in rods will be the total tension in each part, expressed in pounds; to obtain the tension *per square inch*, divide the amount by the area of cross-section of rod.

GLOSSARY OF SYMBOLS.—The following letters, *in all cases*, will be found to express the same meaning, *unless distinctly otherwise stated*, viz.:—

a = *area*, in square inches.
b = *breadth*, in inches.
c = constant for *ultimate resistance to compression*, in pounds, per square inch.
d = *depth*, in inches.
e = constant for *modulus of elasticity*, in pounds-inch, that is, pounds per square inch.
f = *factor-of-safety*.
g = constant for *ultimate resistance to shearing*, per square inch, across the grain.
g_i = constant for *ultimate resistance to shearing*, per square inch, lengthwise of the grain.
h = *height*, in inches.
i = *moment of inertia*, in inches. [See Table I.]
k = *ultimate modulus of rupture*, in pounds, per square inch.
l = *length*, in inches.
m = *moment or bending moment*, in pounds-inch.
n = *constant* in Rankine's formula for compression of long pillars. [See Table I.]
o = the *centre*.
p = the *amount* of the *left-hand re-action* (or support) of beams, in pounds.
q = the *amount* of the *right-hand re-action* (or support) of beams, in pounds.
r = *moment of resistance*, in inches. [See Table I.]
s = *strain*, in pounds.
t = constant for *ultimate resistance to tension*, in pounds, per square inch.
u = *uniform load*, in pounds.
v = *stress*, in pounds.
w = *load at centre*, in pounds.
x, y and z signify *unknown quantities*, either in pounds or inches.
δ = *total deflection*, in inches.
ρ^2 = *square of the radius of gyration*, in inches. [See Table I.]
𝔡 = *diameter*, in inches.
𝔯 = *radius*, in inches
π = 3.14159, or, say, 3 1-7 signifies the *ratio of the circumference and diameter of a circle*.

If there are more than one of each kind, the second, third, etc., are indicated with the Roman numerals, as, for instance, a, a_i, a_{ii}, a_{iii}, etc., or b, b_i, b_{ii}, b_{iii}, etc.

In taking moments, or bending moments, strains, stresses, etc., to signify at what point they are taken, the letter signifying that point is added, as, for instance:—

m = moment or bending moment at *centre*.
m_A = " " " *point A*.
m_B = " " " *point B*.
m_X = " " " *point X*.
s = strain at *centre*.
s_B = " *point B*.
s_X = " *point X*.
v = stress at *centre*.
v_D = " *point D*.
v_X = " *point X*.
w = load at *centre*.
w_A = " *point A*

[1] Continued from No. 636, page 108.

trated immediately over the braces, there will be no transverse strain whatever, but the braces will be compressed the full amount of the respective loads on each. In the case of uniform loads, transverse strains cannot be avoided, of course, but where loads are concentrated the struts should always be placed immediately under them. Even where loads are placed very unevenly, it is better to have the panels of the truss irregular, thus avoiding cross or transverse strains. This same rule holds good in designing trusses of any kind.

Struts placed under load.

Necessary Conditions. Table XVIII shows very clearly the amount and kind of strains in each part of trussed beams. Where there are two struts and they are of any length care must be taken by diagonal braces or otherwise, to keep the lower ends of braces from tipping towards each other. Theoretically they cannot tip, but practically, sometimes, they do. Care must be taken that the beam is braced sideways, or else it must be figured for its safety against lateral flexure (Formula 5.) Then it must have material enough not to shear off at supports, nor to crush its under side where lying on support. The ends of rods must have sufficient bearing not to crush the wood. Iron shoes are sometimes used, but if very large are apt to rot the wood. In that case it is well to have a few small holes in the shoes, to allow ventilation to end of timber. If iron straps and bolts are used at the end, care must be taken that the strap does not tear apart at bolt holes; that it does not crush itself against bolts; that it does not shear off the bolts, and that it does not crush in the end of timber. Care must also be taken to have enough bolts, so that they do not crush the wood before them, and to keep the bolts from shearing out, that is tearing out the wood before them. In all trusses and trussed works the joints must be carefully designed to cover all these points. Many architects give tremendous sizes for timbers and rods in trusses, thus adding unnecessary weight, but when it comes to the joint, they overlook it, and then are surprised when the truss gives out. The next time they add more timber and more iron, till they learn the lesson. It must be remembered that the strength of a truss is only equal to the strength of its weakest part, be that part a member or only a part of a joint. This subject will be fully dealt with in the chapter on Trusses.

Importance of Joints.

Depth Desirable. The deeper the truss is made, that is, the further we separate the top and bottom chords, the stronger will it be; besides additional depth adds very much to the stiffness of a truss.

Deflection of Girders and Beams. All trussed beams, and all trusses should be "cambered up," that is, built up above their natural lines sufficiently to allow for settling back into their correct lines, when loaded. The amount of the camber should equal the calculated deflection. For all beams, girders, etc., of uniform cross-section throughout, the deflection can be calculated from Formulæ (37) to (42) according to the manner of loading. For wrought-iron beams and plate-girders of uniform cross-section throughout, the deflection can be calculated from the same formulæ; where, however, the load is uniform and it is desired to simplify the calculation, the deflection can be quite closely calculated from the following Formula:

Uniform Cross-section and Load.

$$\delta = \frac{L^2}{75.d} \qquad (79)$$

Where δ = the greatest deflection at centre, in inches, of a wrought-iron beam or plate girder of uniform cross-section throughout, and carrying its total safe uniform load, calculated for rupture only.

Where L = the length of span, in feet.

Where d = the depth of beam or girder in inches.

If beam or plate girder is of steel, use $64\frac{1}{2}$ instead of 75.

If the load is not uniform, change the result, as provided in cases (1) to (8), Table VII.

For a centre load we should use $93\frac{3}{4}$ in place of 75 or

Uniform Cross-section, Centre Load.

$$\delta = \frac{L^2}{93\frac{3}{4}.d} \qquad (80)$$

Where values are the same, as for Formula (79) except that beam or girder carries its total safe centre load, calculated for rupture only.

If beam or girder is of steel use $80\frac{5}{8}$ instead of $93\frac{3}{4}$.

Therefore not to crack plastering and yet to carry their full safe loads, wrought-iron beams or plate girders should never exceed in length (measured in feet) twice and a quarter times the depth (measured in inches), if the load is uniform, or

Safe length, uniform Cross-section and Load.

$$2\tfrac{1}{4}.\, d = L \qquad (81)$$

Where L = the ultimate length of span (not to crack plastering), in feet, of a wrought-iron beam or plate girder, of uniform cross-section throughout and uniformly loaded with its total safe load.

Where d = the depth of beam or girder in inches.

If beam or girder is of steel, use 2 instead of $2\frac{1}{4}$.

If the load is central the length in feet should not exceed $2\frac{1}{8}$ times the depth in inches, or

Safe length, uniform Cross-section, Centre Load.

$$2\tfrac{1}{8}.\, d = L. \qquad (82)$$

Where L = the ultimate length of span in feet (not to crack plastering), of a wrought-iron beam or plate girder, of uniform cross-section throughout, and loaded at its centre with its total safe load.

Where d = the depth of beam or girder in inches.

If beam or girder is of steel use $2\frac{3}{8}$ instead $2\frac{1}{4}$.

Deepest beam most economical. One thing should always be remembered, when using iron beams, and that is, that the deepest beam is *always* not only the stiffest, but the most economical. For instance, if we find it necessary to use a $10\frac{1}{2}''$ beam—105 pounds per yard, it will be cheaper to use instead the 12′ beam—96 pounds per yard. The latter beam not only weighs 9 pounds per yard less, but it will carry more, and deflect less, owing to its extra two inches of depth. This same rule holds good for nearly all sections.

Deflection of Trusses. To obtain the deflections of trussed beams or girders by the rules already given would be very complicated. For these cases, however, Box gives an approximate rule, which answers every purpose. He calculates the amount of extension in the tension (usually the lower) chord, and the amount of contraction in the compression (usually the upper) chord, due to the strains in each, and from these, obtains the deflections. Of course the *average* strain in each chord must be taken and not the greatest strain at any one point in either. In a truss, where each part is proportioned in size to resist exactly the compressive or tensional strain on the part, every part will, of course, be strained alike; the strain in the compressive member being $= \left(\frac{c}{f}\right)$ per square inch, throughout the whole length, and in the tension member $= \left(\frac{t}{f}\right)$ per square inch, throughout the whole length.

The same holds good for plate girders, where the top and bottom flanges are diminished towards the ends, in proportion to the bending moment. But where, as in wrought-iron beams (and in many trusses), the flanges are made, for the sake of convenience, of uniform cross-section throughout their entire length, the "average" strain will, of course, be much less, and consequently the beam or girder stiffer.

Average Strain in Chords. If we construct the graphical representation of the bending moments at each point of beam (as will be explained in the next Chapter) and divide the area of this figure in inch-pounds by the length of span in inches, we will obtain the average strain in either flange, provided the flange is of uniform cross-section throughout, or

Uniform Cross-section.

$$v = \frac{a}{l} \qquad (83)$$

Where v = the *average* strain, in pounds, on top or bottom flange or chord, where beam or girder is of uniform cross-section throughout.

Where l = the length of span, in inches.

Where a = the area in pounds-inch of the graphical figure giving the bending moment at all points of beam.

To obtain the dimensions of this figure measure its base line (or horizontal measurement) in inches, and its height (or vertical measurement) in pounds, assuming the greatest vertical measurement as $= \left(\frac{c}{f}\right)$ or $= \left(\frac{t}{f}\right)$, in pounds, according to which flange we are examining.

Thus, in the case of a uniform load, this figure would be a parabola, with a base of length equal to the span measured in inches, and a height equal to the greatest fibre strains in pounds; the average

strain therefore in the compression member of a beam, girder or truss, of uniform cross-section throughout would be, — (remembering that the area of a parabola is equal to two-thirds of the product of its height into its base),

Uniform load and Cross-section.

$$v = \frac{\frac{2}{3}.l.\left(\frac{c}{f}\right)}{l} \text{ or}$$

$$v = \frac{2}{3}.\left(\frac{c}{f}\right) \qquad (84)$$

Where $v =$ the *average* strain, in pounds, in compression flange or chord of a beam, girder or truss of uniform cross-section throughout and carrying its total safe uniform load.

Where $\left(\frac{c}{f}\right) =$ the safe resistance to compression per square inch of the material.

It is supposed, of course, that at the point of greatest bending moment — or where the greatest compression strain exists — that the part is designed to resist or exert a stress $= \left(\frac{c}{f}\right)$ per square inch. If the greatest compression stress is less, insert its value in place of $\left(\frac{c}{f}\right)$. Of course, it must never be greater than $\left(\frac{c}{f}\right)$.

Similarly we should have

Uniform Load and Cross-section.

$$v = \frac{2}{3}.\left(\frac{t}{f}\right) \qquad (85)$$

Where $v =$ the *average* strain, in pounds, in tension flange or chord of a beam, girder or truss of uniform cross-section throughout, and carrying its total safe uniform load.

Where $\left(\frac{t}{f}\right) =$ the safe resistance to tension, per square inch, of the material.

It being understood that at the point of greatest bending moment — or where the greatest tension strain exists — that the part is designed to resist or exert a stress $= \left(\frac{t}{f}\right)$ per square inch. If this greatest tensional stress is less than $\left(\frac{t}{f}\right)$ insert its value in its place in Formula (85). Of course, it must never be greater than $\left(\frac{t}{f}\right)$.

For a beam, girder or truss with a load concentrated at the centre, but with flanges or chords of uniform cross-section throughout, the average strain would be just one-half that at the centre; for, the bending-moment graphical-figure will be a triangle, and inserting the values in Formula (83) would give for the compression member:

Centre Load Uniform Cross-Section.

$$v = \frac{1}{2}.\left(\frac{c}{f}\right) \qquad (86)$$

and for the tension member:

$$v = \frac{1}{2}.\left(\frac{t}{f}\right) \qquad (87)$$

The meaning of letters being the same as in Formulæ (84) and (85), but the total safe load being concentrated at the centre instead of uniformly distributed.

To obtain the amount of contraction or expansion due to this average strain, use the following Formula:

Expansion or Contraction from Strain.

$$x = \frac{v.l}{e} \qquad (88)$$

Where $v =$ the *average* strain, in pounds per square inch, in either chord or flange.

Where $l =$ the length of span, in inches.

Where $e =$ the modulus of elasticity of the material, in pounds-inch.

Where $x =$ the amount of extension or contraction, in inches, of the chord or flange.

Now let us apply the above rules to beams, plate girders, and trussed beams. Taking the case of a beam or plate girder or truss with parallel flanges or chords.

Figure 145 shows the same, after the deflection has taken place. We can now assume approximately, that $C A$ is equal to one-half the difference between the contraction of $G C$ and the elongation of $H B$, or, what amounts to the same thing, that $C A$ is equal to one-half the sum of the contraction of the one and the elongation of the other.

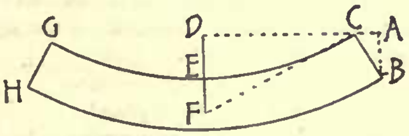


Fig. 145.

Further, we can assume that approximately, $A\ B = d$ or the depth of beam, and $C\ D = \frac{l}{2}$ or one half the span.

The curve $C\ E\ C$ will approximate a parabola, so that if we draw a tangent $C\ F$ to the same at C, we know that $D\ E = E\ F = \frac{D\ F}{2}$ or $D\ F = 2.\ D\ E$. But as $D\ E$ represents the deflection (δ) of the beam, we have

$$D\ F = 2.\ \delta.$$

Now as $C\ F$ is normal to $C\ B$, and $C\ D$ normal to $A\ B$, we know that angles $D\ C\ F = A\ B\ C$; further, as both triangles are right angle triangles, we know that they are similar, therefore:

$$D\ F : C\ A \therefore D\ C : A\ B, \text{ or}$$

$$2.\ \delta : C\ A \therefore \frac{l}{2} : d \text{ or}$$

$$\delta = \frac{C\ A.\frac{l}{2}}{2.d} = \frac{C\ A.\ l}{4.\ d}.$$

If now we assume the sum of the extension and contraction of the two flanges or chords to be $= x$.

We have $C\ A = \frac{x}{2}$ or

Deflection of Parallel Flanges or Chords, any Cross-section.

$$\delta = \frac{x.\ l}{8.\ d} \qquad (89)$$

Where $\delta =$ the deflection, in inches, of a beam, plate girder or truss, with parallel flanges or chords.

Where $x =$ the sum of the amount of extension in tension chord, plus the amount of contraction in compression chord.

Where $l =$ the length of span, in inches.

Where $d =$ the total depth of beam, girder or truss in inches.

Take the case of a wrought-iron plate girder or beam of uniform cross-section throughout carrying its full uniform load, we should have the strain at the centre on the extreme fibres $= 12000$ pounds per square inch. Now the average strain on both upper and lower flanges would be, Formulæ (84) and (85).

$$v = \frac{2}{3}.\ 12000 = 8000 \text{ pounds}$$

per square inch. Therefore amount of contraction in upper flange Formula (88), (and remembering that, from Table IV, $e = 27000000$)

$$x = \frac{8000.\ l}{27000000} = \frac{l}{3375}$$

The elongation of the bottom flange would be an equal amount, therefore the sum of the two

$$x_1 = 2.\ x = \frac{2.\ l}{3375}$$

$$= \frac{l}{1687,5}$$

Inserting these values in Formula (89) we have the deflection

$$\delta = \frac{l^2}{8.1687,5.\ d} = \frac{l^2}{13500.\ d}$$

and inserting for $l^2 = 144.\ L^2$, we have

$$\delta = \frac{144.\ L^2}{13500.\ d.}$$

$$= \frac{L^2}{93\frac{3}{4}.\ d.}$$

Had we assumed that the area of flanges or chords diminished towards the supports in proportion to the bending moment or actual stresses required, the average strain would, of course, be 12000 pounds per square inch throughout the entire length, no matter how the load might be applied.

Inserting this value in Formula (88) we should have had, for the amount of contraction of top flange

$$x = \frac{12000.\ l}{27000000} = \frac{l}{2250}$$

The same for the extension of bottom chord, or

$$x_1 = 2.\ \frac{l}{2250} = \frac{l}{1125}$$

Inserting this in Formula (89) we have for the deflection:

$$\delta = \frac{l^2}{8.1125.\ d} = \frac{l^2}{9000.\ d}$$

Inserting 144 $L^2 = l^2$ we have

$$\delta = \frac{144.\ L^2}{9000.\ d} \text{ or}$$

Parallel flanges or Chords, Diminished Cross-section, any loads.

$$\delta = \frac{L^2}{62\frac{1}{2}.d} \qquad (90)$$

Where δ = the greatest deflection, in inches, of a wrought-iron plate girder, or wrought-iron truss, with parallel flanges or chords, and where the areas of flanges or chords are gradually diminished towards supports, and no matter how the load is applied; in no part however must the stresses, per square inch exceed respectively either $\left(\frac{c}{f}\right)$ or $\left(\frac{t}{f}\right)$.

Where L = the length of span, in feet.

Where d = the total depth (heights), in inches, from top of top flange or chord to bottom of bottom flange or chord.

If girder or truss is of steel, use $53\frac{5}{8}$ instead of $62\frac{1}{2}$.

From Formula (90) and Formula (28) we get the rule that (no matter how the load is applied) if we want to carry the full safe load and not have deflection enough to crack plastering the length in feet must not exceed $1\frac{7}{8}$ times the total depth in inches.

For:

$$L.\ 0{,}03 = \frac{L^2}{62\frac{1}{2}.d} \text{ or}$$

$$L = 62\tfrac{1}{2}.0{,}03.d$$

$$= 1{,}875.d \text{ or say}$$

Safe Length, Diminished Cross-section, any Load, Parallel Flanges or Chords.

$$L = 1\tfrac{7}{8}.d \qquad (91)$$

Where L = the length, in feet, of a wrought-iron plate girder or wrought-iron truss, with parallel flanges or chords and with area of flanges or chords diminishing gradually towards supports and no matter how the load is applied; in no part however must the stresses, per square inch, exceed respectively either $\left(\frac{c}{f}\right)$ or $\left(\frac{t}{f}\right)$.

Where d = the total depth (height), in inches, from top of top flange or chord to bottom of bottom flange or chord.

If girder or truss is of steel, use $1\frac{5}{8}$ instead of $1\frac{7}{8}$.

We see therefore that a beam of diminishing cross-section throughout is only about $\frac{2}{3}$ as stiff, as one with uniform cross-section, as its amount of deflection will be one-half more than that of the latter. Both deflections are approximate only, however, as we see by comparing the amount for the uniform cross-section to that obtained from Formula (79). The deflection for varying cross-sections however can be assumed as nearly enough correct, as these are never diminished so much practically as we have assumed in theory. Now taking the case of a trussed beam.

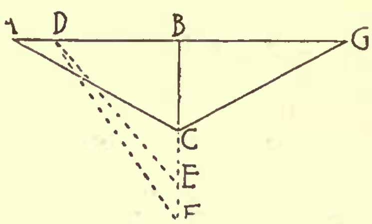


Fig. 146.

Deflection Trussed Beam. In Figure 146, let $A\ B$ be one half of a trussed beam, let $B\ C$ be the strut and $A\ C$ the tie. We will consider the load concentrated at B. Now the first effect is to shorten $A\ B$ by compression, let us say to $D\ B$.

Then, of course, $A\ D$ will represent one half of the contraction in the whole beam $A\ G$. Now the end of rod A moving to D will, of course, let the point C down to E, if we make $D\ E = A\ C$.

But there will be an elongation in $D\ E$ besides, due to the tension in it, which will let it down still further, say to F, if $D\ F = A\ C +$ elongation in $A\ C$, of course the point B will move down too, but we can overlook this to avoid complication. We now have $C\ F$ representing the amount of the deflection. To this should be added the amount of contraction of $B\ C$ due to the compression in it. We can readily find $C\ F$.

We know that

$$B\ F = \sqrt[2]{D\ F^2 - D\ B^2}$$

Now $D\ F$ we know is $= A\ C$ plus the elongation of $A\ C$ due to the tension in it, which we can find from Formula (88). From same formula we find the amount of contraction in $A\ G$ of which $A\ D$ is one-half, subtracting this from $A\ B$ or $\frac{l}{2}$ leaves, of course, $D\ B$.

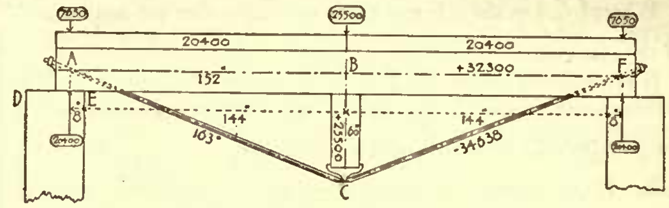
Now having found $B\ F$ we substract from it $B\ C$, the length of which is known, and the balance is of course the deflection $C\ F$; to this we add the contraction of $B\ C$ and obtain the total deflection of the whole trussed beam.

If the load had been a uniform load, instead of a concentrated one over the strut, there would be a deflection in that part of $A\ G$ which would be acting as a continuous girder. But this deflection would take place between B and G and between B and A and would not affect the deflection of the whole trussed beam.

An example will make much of the foregoing more clear.

Example.

Trussed Beam. *A trussed Georgia Pine beam is 16″ deep and of 24 feet clear span; it bears 16″ on each support and is trussed as*



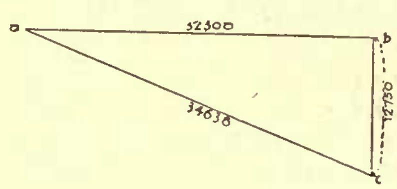


Fig. 147.

shown in Figure 147. The beam carries a uniformly distributed load of 40800 pounds on the whole span, including weight of beam and trussing. Of what size should the parts be?

We draw the longitudinal neutral axes of each part, namely $A\ B$ $B\ C$ and $A\ C$. The latter is so drawn that the neutral axis of the reaction, which is of course half way between D and E (or 8″ from E) will also pass through A.

In designing trusses this should always be borne in mind, that so far as possible all the neutral axes at each joint should go through the same point.

Cross-strains in Beams. The beam $A\ F$ virtually becomes a continuous girder, of two equal spans of 12 feet or 144″ each, uniformly loaded with 20400 pounds each, and supported at three points A, B and F. From table XVII we know that the greatest bending moment is at B and

$$= \frac{u.l}{8} = \frac{20400.144}{8} = 367200 \text{ pounds-inch.}$$

The modulus of rupture for Georgia pine (Table IV) is $\left(\frac{k}{f}\right) =$ 1200, therefore moment of resistance (r) from Formula (18) and Table I, section No. 2,

$$r = \frac{b.d^2}{6} = \frac{367200}{1200} \text{ or}$$

$$b.d^2 = 1836$$

Now we know that $d = 16$, or $d^2 = 256$, therefore

$b = \frac{1836}{256} = 7{,}2$ or say we need a beam $7\frac{1}{4}'' \times 16''$ for the transverse strain. We must add to this however for the additional compression due to the trussing.

Compression in Strut. The amount of the load carried by strut $C\ B$, see Table XVII, is

$$= \tfrac{5}{8}.u \text{ from each side, or}$$

$$= 25500 \text{ on the strut } B\ C, \text{ of which}$$

$$= 12250 \text{ from each side.}$$

Compression in Beam. If now we make at any scale a vertical line $b\ c$ = *half* the load carried at point B or = 12250 in our case, and draw $b\ a$ horizontally and $a\ c$ parallel to $A\ C$, we find the strain in $B\ A$ by measuring $b\ a$ = (32300 pounds) or in $A\ C$ by measuring $a\ c$ = (34638 pounds) both measured at same scale as $b\ c$. We find, further, in passing around the triangle $c\ b\ a\ c$ — ($c\ b$ being the direction of the reaction at A), that $b\ a$ is pushing towards A, therefore compression; and that $a\ c$ is pulling away from A, therefore tension. Using the usual signs of + for compression, and — for tension, we have then:

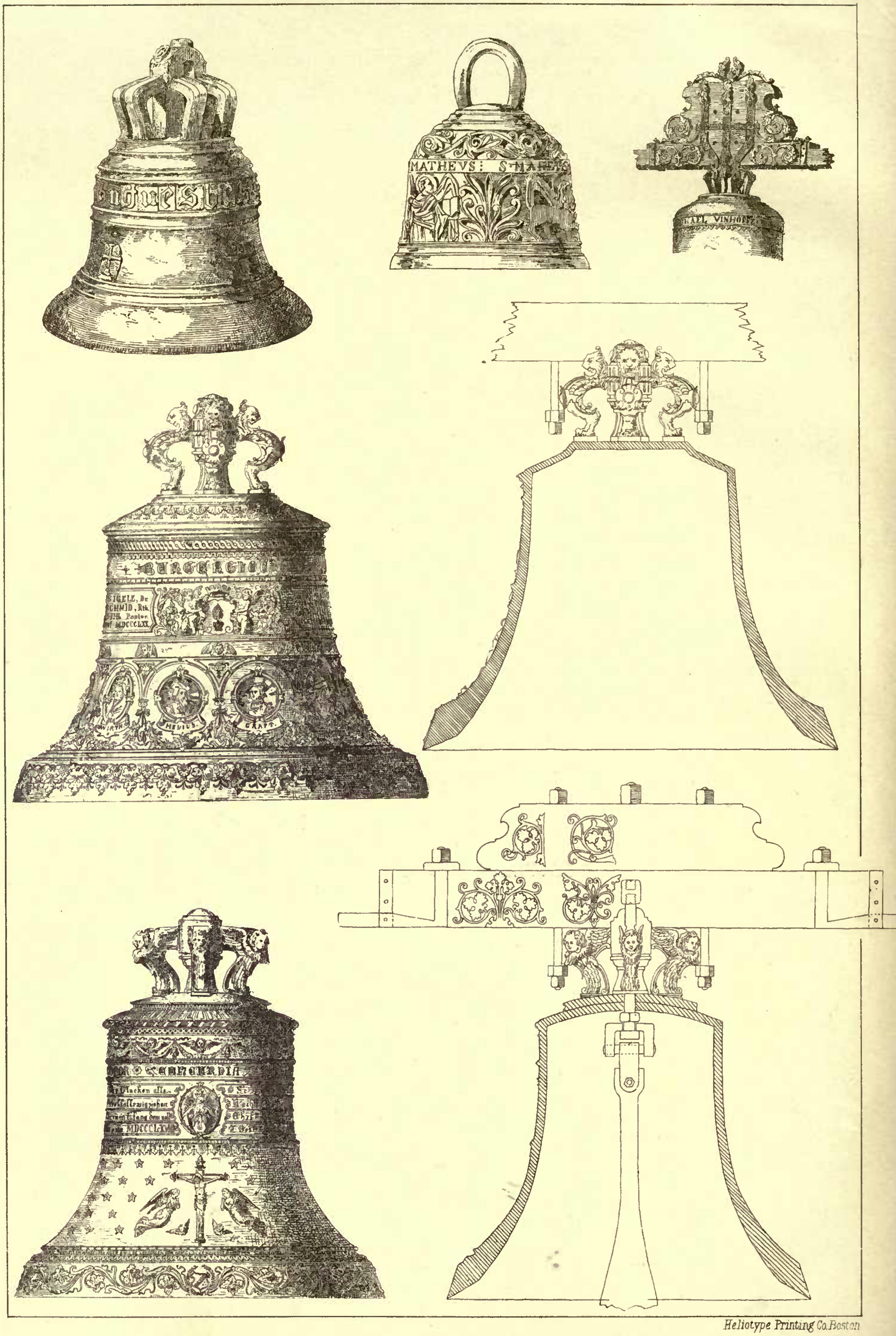
$$A\ B = +\ 32300 \text{ pounds.}$$

$$A\ C = -\ 34638 \text{ pounds.}$$

$$B\ C = +\ 25500 \text{ pounds.}$$

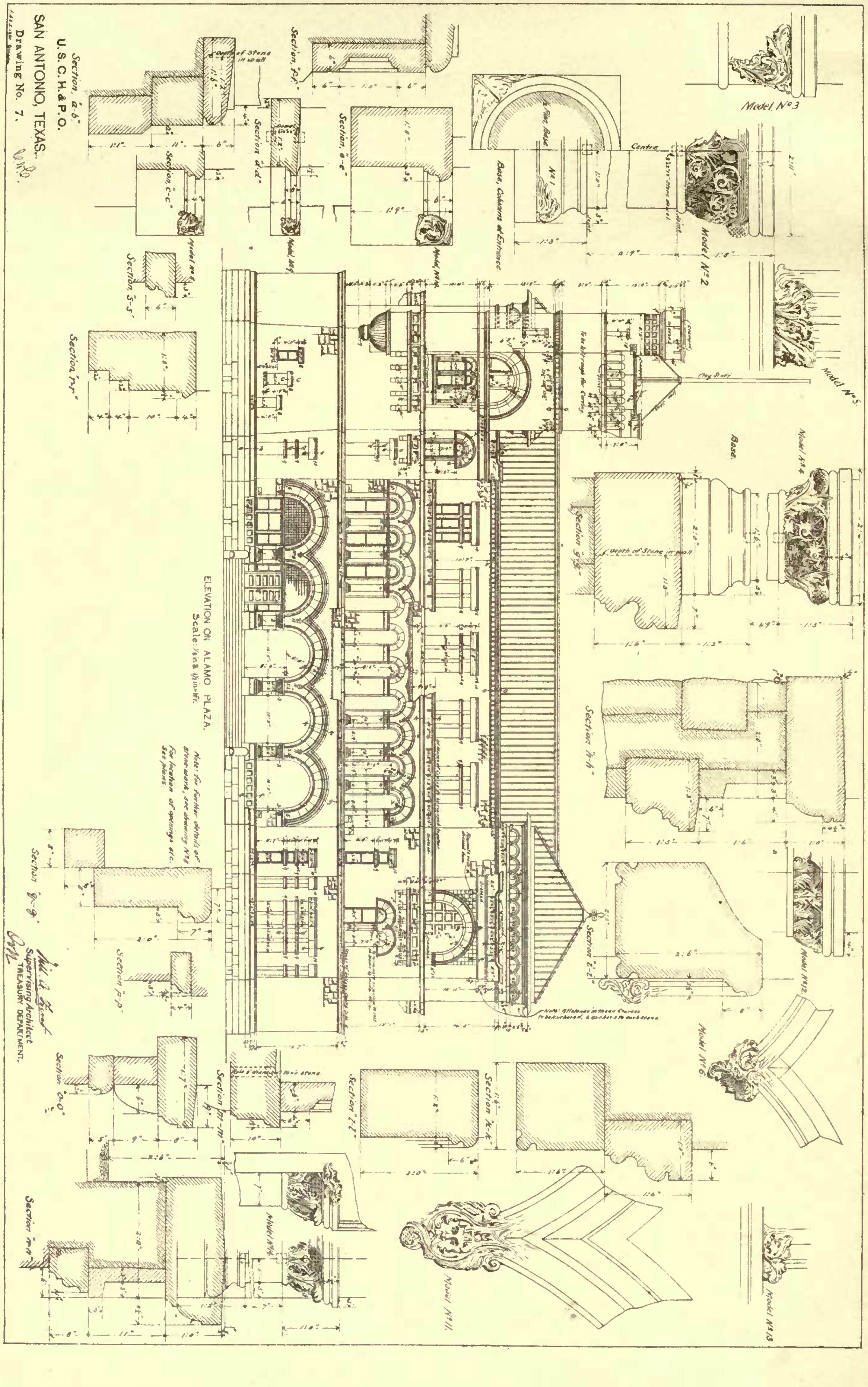
Had we used Table XVIII we should have had the same result for:

COPYRIGHT 1888 BY TICKNOR & CO



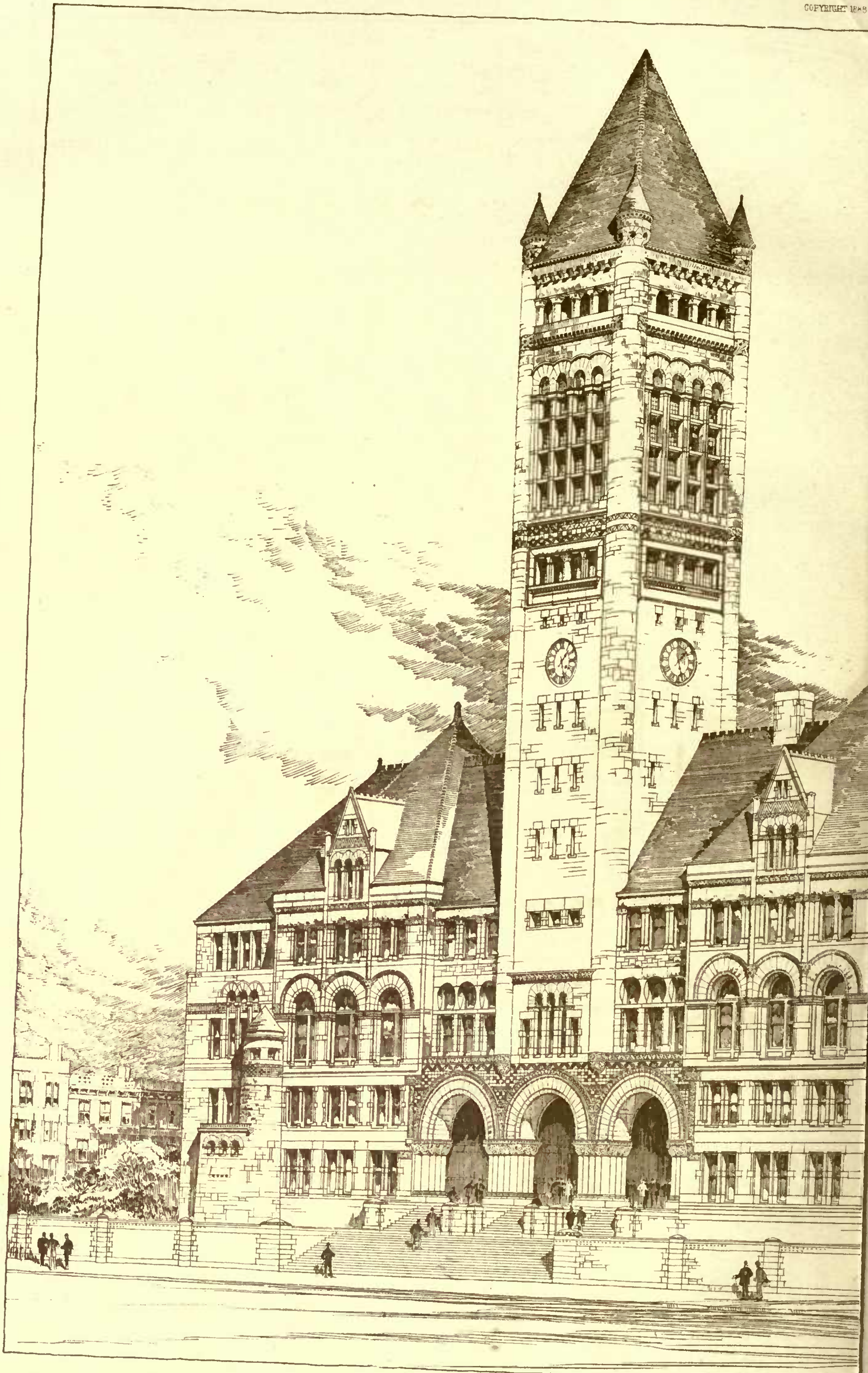
Heliotype Printing Co. Boston

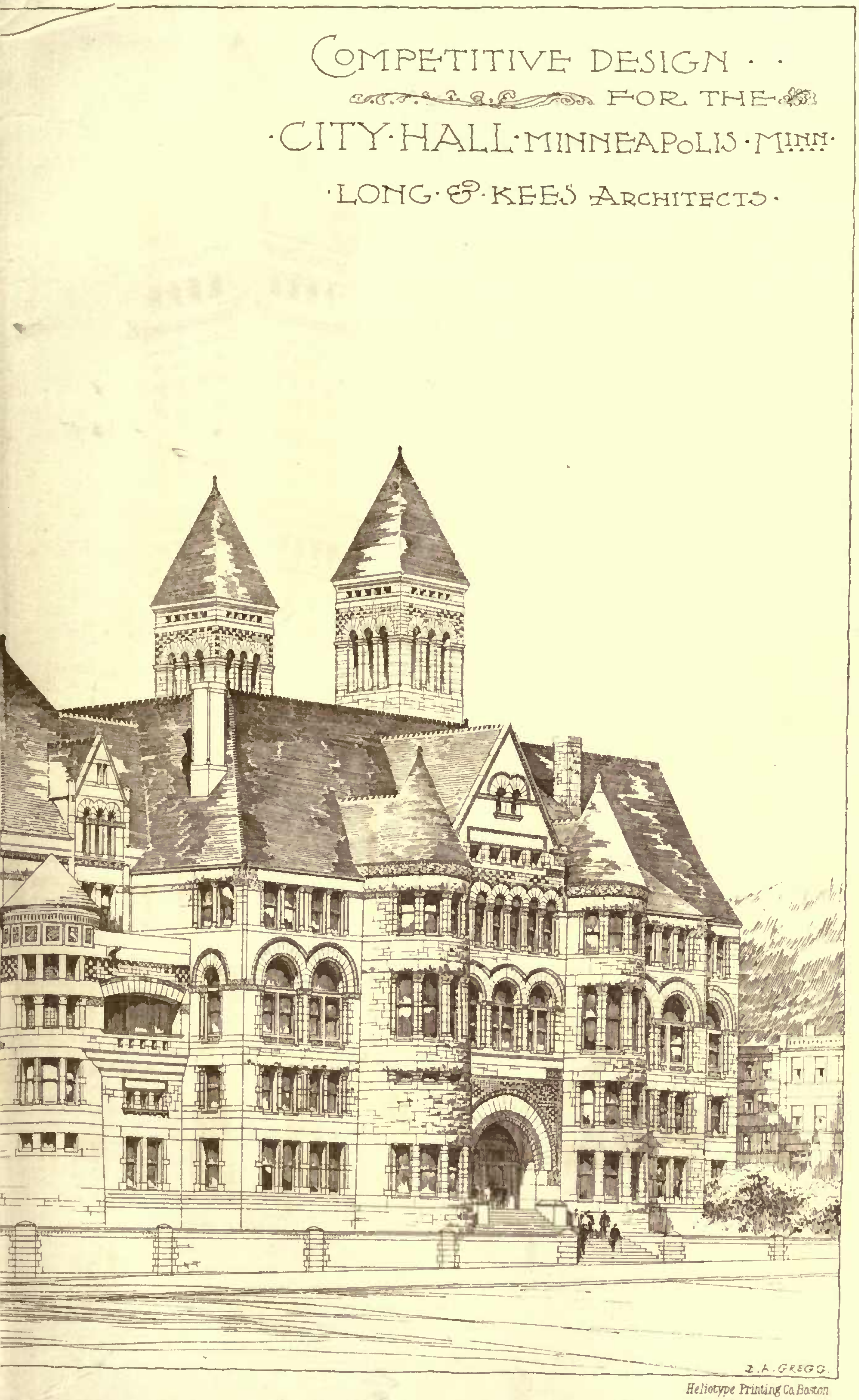
COPYRIGHT 1888 BY TICKNOR & Co



Heliotype Printing Co. Boston

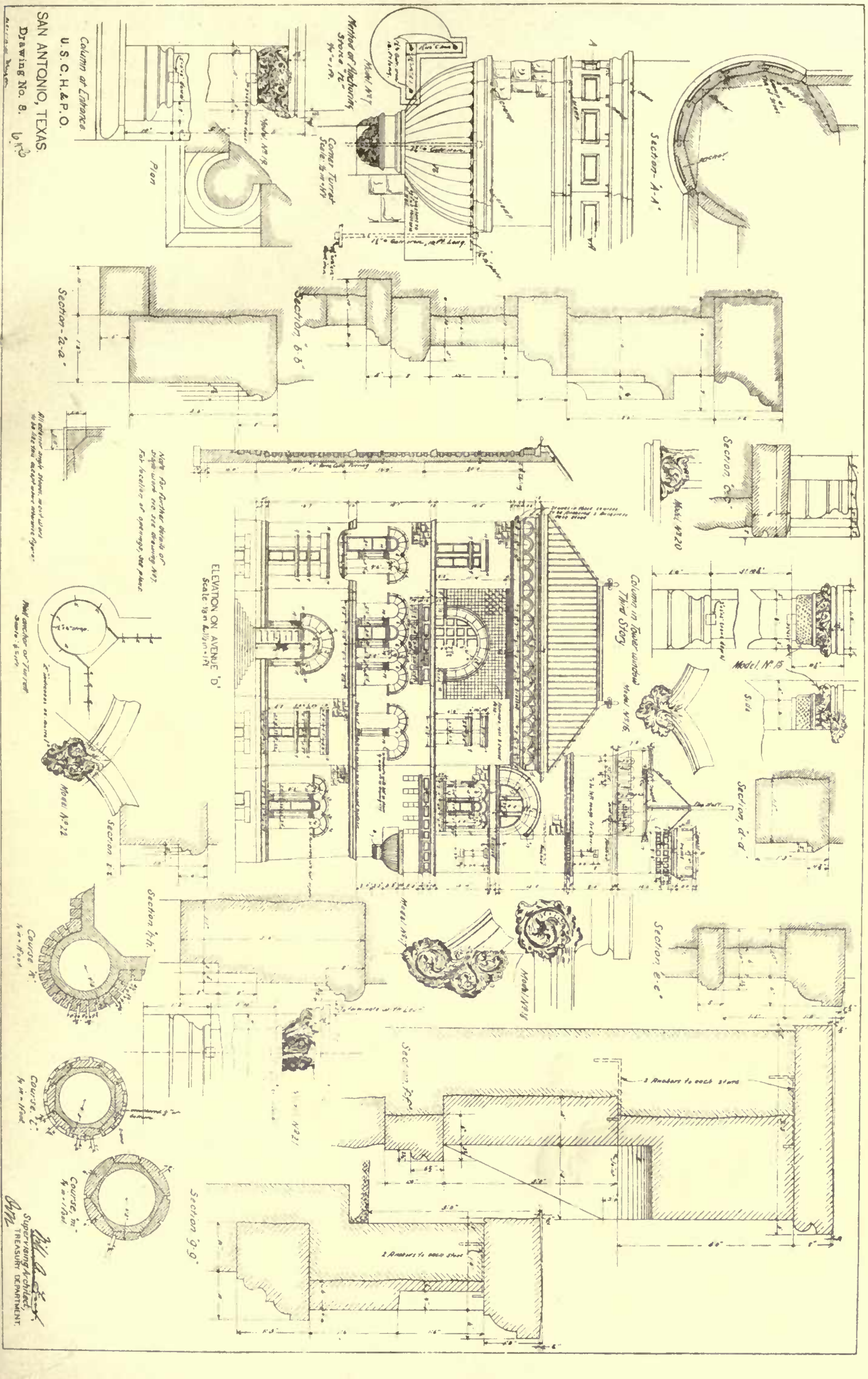
COPYRIGHT 188





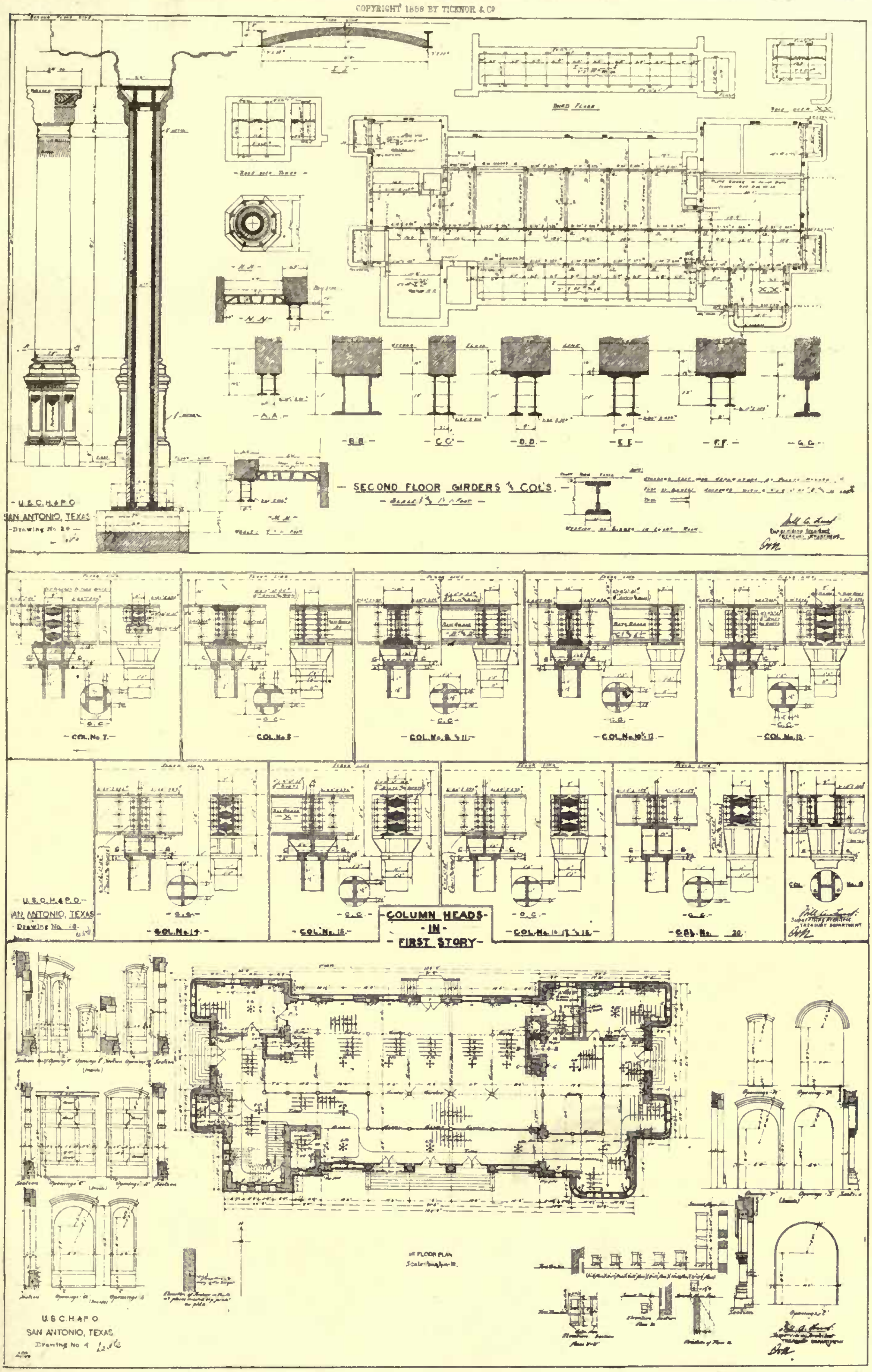
Heliotype Printing Co. Boston

COPYRIGHT 1888 BY TICKNOR & Co



Heliotype Printing Co. Boston

COPYRIGHT 1888 BY TICKNOR & Co



Compression in $A\,B = \frac{25500}{2}\cdot\frac{A\,B}{B\,C} = +32300$ pounds and

Tension in $A\,C = \frac{25500}{2}\cdot\frac{A\,C}{B\,C} = -34638$ pounds.

Now the safe resistance of Georgia pine to compression along fibres (Table IV) is

$$\left(\frac{c}{f}\right) = 750 \text{ pounds.}$$

If $A\,B$ were very long, or the beam very shallow or very thin, we should still further reduce $\left(\frac{c}{f}\right)$ by using Formula (3). But we can readily see that the beam will not bend much by vertical flexure due to compression, nor will it deflect laterally very much, so we can safely allow the maximum safe stress per square inch, or 750 pounds and consider $A\,B$ a short column.

The necessary area to resist the compression, Formula (2) is:

$$32300 = a.\,750 \text{ or}$$

$$a = \frac{32300}{750} = 43 \text{ square inches.}$$

As the beam is 16″ deep, this would mean an additional thickness $= \frac{43}{16} = 2\frac{11}{16}$

Adding this to the $7\frac{1}{4}''$ already found to be necessary, we have

$$7\tfrac{1}{4} + 2\tfrac{11}{16} = 9\tfrac{15}{16}$$

or the beam would need to be, say 10″ x 16″.

Size of Strut. Now the size of $B\,C$ must be made sufficient not to crush in the soft underside of the beam at B. The bearing here would be across the fibres of the beam, and we find (Table IV) that the safe compressive stress of Georgia pine across the fibres is $\left(\frac{c}{f}\right) = 200$ pounds. We need therefore an area

$$a = \frac{25500}{200} = 128 \text{ inches.}$$

As the beam is only 10″ wide the strut $B\,C$ will have to measure, $\frac{128}{10} = 12\frac{4}{5}$ inches the other way, or we will say it could be 10″ x 12″. This strut itself might be made of softer wood than Georgia pine, say of spruce; the average compression on it is

$$\frac{25500}{10.12} = 212 \text{ pounds per square inch.}$$

Now spruce will stand a compression on end (Table IV) of $\left(\frac{c}{f}\right) = 650$ or, even if spruce is used, the actual strain would be less than one-third of the safe stress. At the foot of the strut $B\,C$ we put an iron plate, to prevent the rod from crushing in the wood. The rod itself must bear on the plate at least

Iron Shoe to Strut. $\frac{25500}{12000} = 2{,}1$ square inches, or it would crush the iron — (12000 pounds being the safe resistance of wrought-iron to crushing).

Size of Tie-rod. The safe tensional stress of wrought-iron being 12000 pounds per square inch (Table IV), we have the necessary area for tie-rod $A\,C$ from Formula (6)

$$34638 = a\,.\,12000 \text{ or}$$

$$a = \frac{34638}{12000} = 2{,}886 \text{ square inches.}$$

From a table of areas we find that we should require a rod of 1 15-16″ diameter, or say a 2″ rod.

The area of a 2″ rod being $= 3{,}14$ square inches the actual tensional stress, per square inch on the rod, will be only

$$\frac{34638}{3{,}14} = 11312 \text{ pounds per square inch.}$$

Size of Washer. We must now proportion the bearing of the washer at "A" end of tie-rod. The amount of the crushing coming on washer will be whichever of the two strains at A, (viz. $B\,A$ and $A\,C$) is the lesser, or $B\,A$ in our case, which is 32300 pounds. We must therefore have area enough to the washer not to crush the end of beam (or along its fibres), the safe resistance of which we already found to be: $\left(\frac{c}{f}\right) = 750$ pounds per square inch; we need therefore.

$$\frac{32300}{750} = 43 \text{ square inches.}$$

The washer therefore should be about

$6\frac{1}{2}''$ by $6\frac{1}{2}''$

Upset Screw-end. The end of the rod *must* have an "upset" screw-end; that is, the threads are raised above the end of rod all around, so that the area at the bottom of sinkage, between two adjoining threads, is still equal to the full area of rod. If the end is not "upset" the whole rod will have to be made enough larger to allow for the cutting of the screw at the end, which would be a wilful extravagance.

It is unnecessary to calculate the size of nuts, heads, threads, etc., as, if these are made the regulation sizes, they are more than amply

Central Swivel. strong. It should be remarked here that in all trussed beams, if there is not a central swivel, for tightening the rod, that there should be a nut at *each* end of the rod; and not a head at one end and a nut at the other. Otherwise in tightening the rod from one side only it is apt to tip the strut or crush it into the beam on side being tightened. We must still however calculate the vertical shearing across the beam at the supports, which we know equals the reaction, or 20400 pounds at each end. To resist this we have 10″ x 16″ = 160 square inches, less 3″ x 16″, cut out to allow rod end to pass, or say 112 square inches net, of Georgia pine, across the grain; and as $\left(\frac{g}{f}\right) = 570$ pounds per square inch (see Table IV); the safe vertical shearing stress at each support would be (Formula 7)

$112.570 = 63840$ pounds or more than three times the

Bearing of Beam. actual strain. Then, too, we should see that the bearing of beam is not crushed. It bears on each reaction 16 inches, or has a bearing area $= 16.10 = 160$ square inches. $\left(\frac{c}{f}\right)$ for Georgia pine, across the fibres, Table IV, is

$\left(\frac{c}{f}\right) = 200$, therefore the beam will bear safely at each end

$160.200 = 32000$ pounds or about one-half more than the reaction. There will be no horizontal shearing, of course, except in that part of beam under transverse strain, and this certainly cannot amount to much. The beam is therefore amply safe.

Deflection of Beam. Now let us calculate the deflection. The modulus of elasticity for Georgia pine, Table IV is: $e = 1200000$ pounds-inch. The average compression strain in $A\,F$ was 750 pounds per square inch, therefore the amount of contraction (Formula 88)[1]

$$x = \frac{750.304}{1200000} = 0{,}19 \text{ inches.}$$

Now $A\,D$ (in Fig. 146) will be one-half of this, or 0,095 inches.

The amount of elongation in $A\,C$ will be, remembering that we found the average stress to be only 11312 pounds per square inch, and that for wrought-iron $e = 27000000$ (Formula 88)

$$x = \frac{11312.\,163}{27000000} = 0{,}0682$$

The exact length of $A\,C$ (Fig. 147 should be 163,41 not 163″).

Therefore $D\,F$ (Fig. 146) will be

$$D\,F = 163{,}41 + 0{,}0682 = 163{,}4782''$$

$$D\,B = 152 - 0{,}19$$

$$= 151'',81$$

Therefore (Fig. 146)

$$B\,F = \sqrt[2]{163{,}4782^2 - 151{,}81^2}$$

$$= 60'',655$$

Now $B\,C$ (Fig. 147) would be $= 60''$, deducting this from the above we should have a deflection $= 0'',655$.

To this we must add the contraction of $B\,C$. The strut will be less than 60″ long, say about 50″. The average compressive stress per square inch we found $= 212$ pounds. The modulus of elasticity for spruce, Table IV, is $e = 850000$, therefore contraction in strut (Formula 88)

$$x = \frac{212.50}{850000} = 0{,}0125$$

Adding this to the above we should have the total deflection

$$\delta = 0{,}655 + 0{,}0125$$

$$= 0{,}6675$$

This would be the amount we should have to "camber" up the beam, or say 3-4″.

[1] In reality the contraction of $A\,F$ would be much less, as the part figured for transverse strain only would very materially help to resist the compression, one half of it being in tension.

The safe deflection not to crack plastering, would be (Formula 28)

$$\delta = L.\ 0{,}03$$
$$= 24.0{,}03$$
$$= 0{,}72$$

So that our trussed beam is amply stiff.

Louis DeCoppet Berg.

[To be continued.]

The Illustrations

[*Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.*]

THE KENT GATE, QUEBEC, CANADA.

[Gelatine print, issued only with the Imperial Edition.]

This view is taken from without the city walls. The little Jesuits' chapel shows on the left.

UNITED STATES COURT-HOUSE AND POST-OFFICE, SAN ANTONIO, TEX. MR. W. A. FRERET, SUPERVISING ARCHITECT.

SOME of the details shown here, together with those shown in the *American Architect* for February 4th, will serve to illustrate some parts of the papers in United States Government Building Practice.

COMPETITIVE DESIGN FOR THE CITY-HALL, MINNEAPOLIS, MINN. MESSRS. LONG & KEES, ARCHITECTS, MINNEAPOLIS, MINN.

To these gentlemen was awarded the fourth prize.

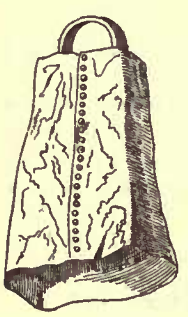
SOME OLD BELLS.

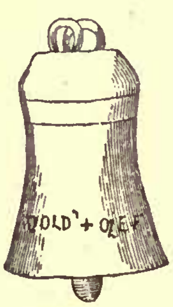
These drawings were made after some loose sheets of the *Allgemeine Bauzeitung* that came into our hands by chance some time ago, and as they had no title, we have not been able to identify the bells.

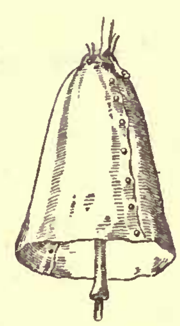
OLD BELLS.

A WRITER in *Chambers' Journal* gives an account of some old bells which perhaps will interest the readers of this journal:

The origin of the bell is not known; but a knowledge of it goes back to a period beyond the written history of nations. The pious Dionysius Barsalabi, in his dissertation on bells, asserts that he finds it recorded in several histories that Noah received a command that the workmen employed in building the Ark should be summoned to their labor by the strokes of wood on a bell; but the earliest mention of them in Scripture is found in Exodus xxviii, 33–35, and xxxix, 25, when speaking of the necessary ornaments for the hem of the high-priest's robe: "And beneath, upon the hem of it, thou shalt make pomegranates of blue and of purple and of scarlet, round about the hem thereof; and bells of gold between them round about; a golden bell and a pomegranate upon the hem of the robe round about. And it shall be upon Aaron to minister: and his sound shall be heard when he goeth in unto the holy place before the Lord, and when he cometh out, that he die not." "And they made bells of pure gold, and put the bells between the pomegranates upon the hem of the robe." It is possible that the Assyrians and Egyptians used







bells exclusively in religious rites, but the Greeks and Romans employed them for secular as well as for religious purposes. At the British Museum may be seen, in a case in the Nimroud Gallery of Assyrian antiquities, eighty small bronze bells with iron tongues, which were found by Layard in a caldron when excavating Nimroud — the ancient Calah of Scripture on the banks of the Tigris, the approximate date of which city may be given from B. C. 885 to 630. The great feasts of Osiris, the judge of the dead, were inaugurated by the Egyptian priests with the ringing of hand-bells, and the Greek priests of Cybele followed the same custom when they sacrificed to the "mother of a hundred gods." Later, they were in more general use with both Greeks and Romans. Pliny refers to the sounding of a bell in public places in Athens to advertise the sale of fish — doubtless the predecessor of the modern town-crier, who may still be heard in remote country districts. The Greek sentries in camps and garrisons, when they heard the ringing of a bell, knew the relief guards were approaching, and were bound to answer the signal. At Rome also the musical tinkling announcing the hour for the indulgence of the luxurious bath was welcomed by the Romans, who made great use of bells as personal ornaments, and adopted them for emblems on their triumphal processional cars.

The small quadrangular hand-bells, made of thin plates of hammered iron, riveted together at the sides and bronzed — a form represented on some of the old Irish stone crosses, and specimens of which are in the British and Hibernian museums — were exclusively used for ecclesiastical purposes. Their introduction into Britain is generally assigned to the wandering monks, who in those early days of Christianity made frequent pilgrimages to Italy. Ireland possesses a rich collection of those old bells, some of which, with a traditional history, are preserved in costly shrines, embellished with gems. In the "*Annals of the Four Masters*" mention is made of the "bell of St. Patrick," which has ever been held in special veneration because of the belief that it was the property of that saint. For generations this relic was in the possession of the Mulholland family, who kept it buried in order to insure its safety during the disturbances which so frequently troubled their country. The last descendant of the family bequeathed the treasure and the secret of its hiding-place to the late Adam McClean, who, on searching, duly found in the spot indicated a strong oaken box, containing the old bell, enclosed in its lovely shrine, and with a Bible written in early Irish characters. This bell is only six inches high, five broad and four deep; the shrine is of beaten brass, covered with an antique design of gold and silver filigree worked in complicated convolutions and knots. The whole is profusely studded over with rock crystals, garnets and other precious stones. It is now in the Royal Irish Academy — an interesting collection that includes the almost unique "bell of Armagh," besides others, rivals in age and beauty. But as a priceless specimen of the skill and workmanship of those early days, none of the caskets in which each bell is placed equals that of St. Patrick. Supplementary to these small bells, used in the services of the church, are others employed for the administration of oaths, which oaths were considered essentially binding and sacred. Apart from the veneration felt for these bells, superstition sometimes invested them with peculiar powers, like the "bell of St. Columbia," for example, known as "Dia Diagheltus" (God's vengeance), which the taker of the oath believed could inflict on a perjurer a terrible and indescribable punishment. Dr. Beresford, the late Archbishop of Armagh, had four very curious old bells of this class. The venerable prelate purchased them at different times and in different parts of Ireland from peasants, whose reverence for their sanctity had declined in these days of progress, and who, fortunately, were not unwilling to part with things to them comparatively worthless, but above all price to a collector.

The suspended bell is a recent introduction compared with the antiquity of the hand-bell used in heathen as in Christian times in the celebration of religious rites. The development of the heavy swinging bell, from the time of the Anglo-Saxons to that of the Normans, must have been tolerably rapid, when the great size and strength of the belfries built by the latter is considered. About the middle of the seventh century, in the reign of Egfrid, Benedict, Abbot of Wearmouth and of Jarrow-upon-Tyne, presented some large bells to his church; and about the same period the Venerable Bede relates how the nuns of St. Hilda at Whitby, were summoned to prayers by the sound of bells. At the present day very few bells are left bearing authentic dates previous to the Reformation, although it is said that one was removed from the belfry of an old church in Cornwall, inscribed "Alfredux Rex," which must, if the inscription was correct, have been in use for a thousand years.

Amoy. — Like most important Chinese cities, Amoy is encircled by a mighty wall, writes Miss Gordon Cumming in the *St. James's Gazette*. The summit of these walls invariably affords the most agreeable walk available; it is the only place which is never crowded, and here a good general view of the city can be obtained. To most Europeans the walls of Canton afford a general standard of size. Those of Amoy are considerably smaller, and in the city itself two features conspicuous in Canton are lacking; namely, the tall pagodas and the great square towers, which are the much-frequented pawn-shops. Descending from the walls one immediately enters a labyrinth of dirty streets and markets, with bewildering crowds forever hurrying to and fro, a thousand details of interest arresting one's attention at every turn. As a matter of course, any one wandering through a Chinese city enters temples innumerable; for though, for by far the most part, they are amazingly dirty, there are generally some distinctive features of interest to be noted. Among these I may mention a fine image of Kwan-yin, the thousand-armed Goddess of Mercy, the special feature being that the great golden halo within which she stands is (or was) formed of a thousand golden hands.

UNITED STATES GOVERNMENT BUILDING PRACTICE.[1]—IX.

IRONWORK.

Eagle des. for Napoleon I,—
by C. Normand—after Roquenet.

In this chapter I propose to enter into the manner of construction of the ironwork required in a fireproof building, also the assumed loads on the several floors and roof, and the general methods used in calculation of strength of same.

The first-floor framing is usually formed of iron girders, running between piers in basement built for this purpose and also as a bearing for first-story columns, and between or on these girders the iron floor-beams are laid.

Many of the interior walls of the building do not descend below the second-floor level, as most of the space on the first floor is required by the post-office department, and only such interior walls as are required to sufficiently stiffen the lower part of the building have their origin in the basement. In the second floor are the principal girders which rest on cast-iron columns, and on these girders are built the interior walls; these girders also support the second-floor beams.

In the second story are generally placed the court-rooms, and as they are always much larger than the office-rooms, it is customary to make them two stories in height, partly for architectural proportion and also for acoustic effect. As the court-rooms would be too wide to span with iron beams and oftentimes even with iron girders, the ceilings are supported by means of iron-trussed partitions, which divide the space over the court-rooms into office-rooms, but when the floor over the court-room is the attic floor, it is a common practice to suspend it from the roof-trusses.

The floors above the second story are carried by means of iron beams built into walls at their respective levels, except in the case of court-room ceilings and floors over them, which may be suspended by either of the methods before mentioned.

In many large public buildings there is a glass ceiling in the central part of building of the second floor level to light the post-office working-room; above this glass ceiling a well extends to the top of building, which is covered with a glazed roof, which lights the interior of the building and the colonnade at each floor.

The main roof is constructed of I-beam rafters and purlins; the roof framing is supported by trusses where required, and on the rafters are riveted the ⊥ iron purlins to support the 2″ terra-cotta tiles.

Dormers are usually constructed with angle-iron frames and cased with galvanized iron of suitable pattern to agree with the building.

The methods of construction and calculating do not vary materially from those in private practice, and only a short, general synopsis will here be given. The loads assumed for fireproof floors, including the weight of construction, are as follows:

First floor, . .	200 pounds per square foot.
Second floor, . .	180 " " " "
All other floors, . .	160 " " " "
For the roof (weight of construction only) measured on slope, . .	50 pounds per square foot.

The wind is calculated with the normal pressure against roof surface as given by accompanying table of normal pressures for different angles with the horizon, on a basis of fifty pounds pressure per square foot against a plane at right angles to its direction.

Angle.	Normal Pressure per sq. ft.	Angle.	Normal Pressure per sq. ft.
5°	$6\frac{6}{10}$ lbs.	45°	$45\frac{1}{10}$ lbs.
10	$12\frac{1}{10}$ "	50	$47\frac{6}{10}$ "
15	$17\frac{5}{10}$ "	55	$49\frac{6}{10}$ "
20	$22\frac{9}{10}$ "	60	50 "
25	$28\frac{1}{10}$ "	65	$50\frac{7}{10}$ "
30	$33\frac{1}{10}$ "	70	$51\frac{6}{10}$ "
35	$37\frac{6}{10}$ "	80	$50\frac{5}{10}$ "
40	$41\frac{7}{10}$ "	90	50 "

Deck roofs and flat slopes are not calculated to resist wind-pressure, but are calculated for snow—from five pounds to twenty pounds per square foot of roof according to locality of building.

For floor-beams uniformly loaded, the tables in "*Carnegie's Pocket Companion*" are used, taking a maximum fibre strain of 12,000 pounds per square inch (*i. e.* factor of 4), and deflections not exceeding $\frac{1}{360}$″ per lineal foot of span to prevent cracking of plaster finish of ceilings underneath.

For unequal loading the girder or beam is calculated and the nearest size stronger is used, in case there is not one of exact strength.

As an example, we will take a room where the weight is equally distributed at 160 pounds to the square foot. The size of the room is 20′ x 30′, see Figure No. 37. It will be found more economical to span this room by a girder across the centre of the short side and frame the floor-beams into it than to use single beams spanning the shorter distance.

The beams are 5′ 0″ apart and 15′ 0″ span, so that the load to be carried by each single beam = 5′ x 15′ x 160 pounds per square foot = 12,000 pounds.

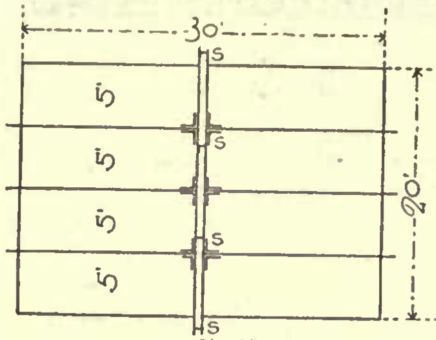


Fig. 37.

By reference to tables we find that a 9″ I-beam weighing 70 pounds per yard will carry 11,580 pounds equally distributed, a little less than the load, so taking the next size stronger, we use a 10″ I-beam 99 pounds per yard, which will carry 16,000 pounds equally distributed. We now take the girder: the load on it = 20′ x 15′ x 160 pounds per square foot = 48,000 pounds with a 20′ span. We find from the tables that one 15″ I-beam weighing 150 pounds per yard will carry 28,240 pounds; using two such beams side by side, the girder is equal to 28,240 pounds x 2 = 57,480 pounds, which is in excess of the load.

The load on the girder is assumed to be evenly distributed, because by calculation it is proved that it is quite safe to use tables of uniformly-loaded beams when the loads are equal and are transmitted at points equidistant on the girder, though several feet apart. The two beams composing the girder are kept the proper distance apart by cast-iron separators (marked *s* in Figure No. 37) bolted through flanges of beams, one separator at each bearing where the shearing force on webs is greatest and intermediate separators spaced not over 6′ 0″ apart.

We will now take the connections for this framing, allowing 7,500 pounds per square inch shearing strain on rivets, and 15,000 pounds per lineal inch bearing value on a pin or rivet one inch in diameter, which may be found also in "*Carnegie's Pocket Companion.*" The load on each beam = 12,000 pounds; one-half (6,000) is transmitted to the wall and the other half is carried to the girder. By table we find one rivet $\frac{5}{8}$″ diameter is safe for 2,300 pounds single shear, therefore

$$\left.\frac{\text{Shear on one end of beam}}{\text{Shearing value of one rivet.}}\right\} = \left\{\frac{6000\text{ lbs.}}{2300\text{ lbs.}}\right. = 2\tfrac{6}{10}\text{ rivets or 3 rivets required.}$$

The web of 10″ I-beam is $\frac{32}{100}$″ thick and bearing value of web on one $\frac{5}{8}$″ diameter rivet = 3,000 pounds, therefore

$$\left.\frac{\text{Load on one end of beam}}{\text{Bearing value of web on 1 rivet.}}\right\} = \left\{\frac{6000\text{ lbs.}}{3000\text{ lbs.}}\right\} = 2\text{ rivets required.}$$

By using a standard connection, as shown in foregoing table, we get bearing of $\frac{32}{100}$″ web on three $\frac{5}{8}$″ diameter rivets at 3,000 pounds each = 9,000 pounds and double shear on three $\frac{5}{8}$″ rivets = single shear on six rivets, which is in excess of what is required. The angle connections being each $\frac{3}{8}$″ thick = $\frac{3}{4}$″ for both, which gives an excess of bearing surface.

For bearings of beams on walls, the usual practice is to distribute the loads so that the pressure on brickwork shall be about 18,000 pounds per square foot. At all beam ends that transmit not over 12,000 pounds to their bearings is used a plate 8″ x 12″, the beam bearing the full width of 8″ on this plate. At the end of girder in the foregoing example, there are 24,000 pounds bearing on each end in wall, which will require a plate 16″ x 12″. No girder is given less than 12″ length of bearing. No cast-iron bearing-plate under a girder is less than 2″ thick and often greater. For example, there is a box-girder, one end of which transmits 144,000 pounds to a wall 2′ wide, allowing a pressure on brickwork of 18,000 pounds per square foot, a bearing-plate is required having an area = $\frac{144000}{18000}$ pounds = 8 square feet = 2′ wide x 4′ long. As the girder is only 18″ wide, the bearing-plate extends 15″ on each side of girder, and unless made sufficiently strong to distribute the load, it will break. Treating the plate as an inverted beam fixed at one end (*i. e.*, in centre, with a projection of 15″ on each side), and uniformly loaded, we find weight on overhanging portion = 15″ x 24″ x 18,000 pounds per square foot = 45,000 pounds, and 45,000 pounds x $7\frac{1}{2}$″, centre of gravity or lever-arm of bending moment = 337,500″ pounds bending moment.

Formula:

$$\text{Depth}^2 = \left\{\frac{\text{Bending Moment}}{\dfrac{\text{Modulus of Rupture}}{6} \times \text{breadth}}\right.$$

[1] Continued from page 9, No. 628.

For an iron plate using a factor of 8, we have

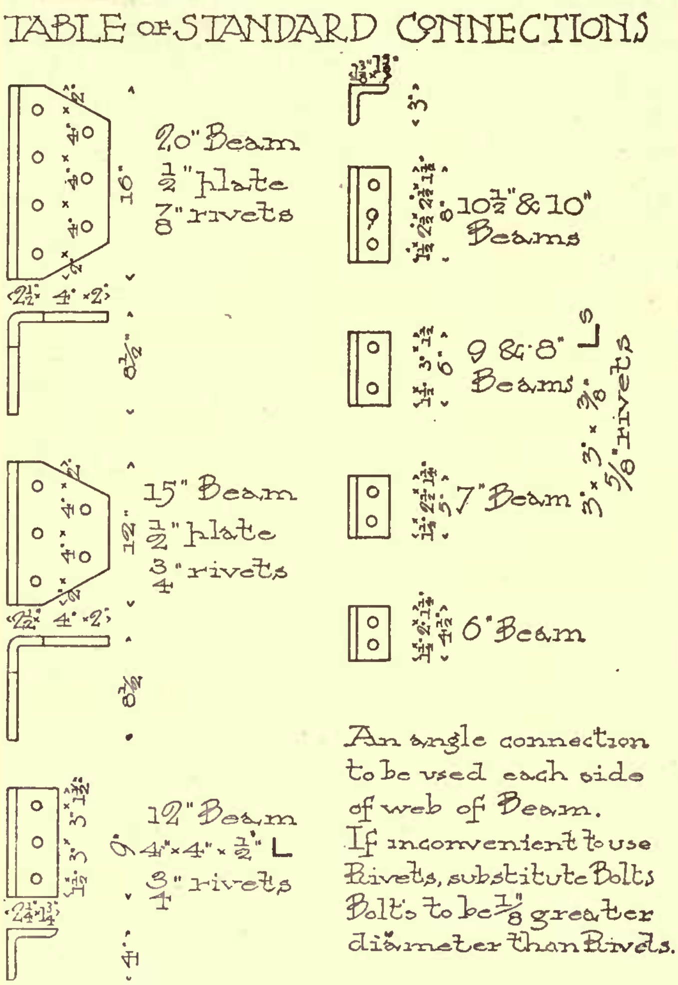
$$\text{Depth}^2 = \frac{337500}{\frac{4000}{6} \times 24''} = 21 \text{ and } \sqrt{21} = 4.5826'', \text{ or will require a}$$

plate say 5″ thick.

For a granite plate same factor 8, we have

$$\text{Depth}^2 = \frac{337500}{\frac{225}{6} \times 24''} = 375 \text{ and } \sqrt{375} = 19.36'', \text{ or will require a}$$

plate 20″ thick.



The modulus of rupture for other materials may be found in Trautwine.

In long spans and heavy loads it frequently happens that rolled beams have not enough depth for proper stiffness and are not as economical as plate or box girders built of plates and angles riveted.

Formulas used for plate-girders in the more common cases.

l = span.
x = distance from support to point where strain is required.
d = depth of girder between centres of gravity of sections of flanges.
w = uniformly-distributed stationary load per unit of length.
W = concentrated load at any point.
$S. fl$ = strain on either flange.
$S. wb$ = strain on web.
l, x and d must be all in the same terms.

The weight of the girder itself must never be omitted from the calculations of the strains.

Girders fixed at one end only.

Case 1. Load (W) at extremity.

At the support $S. fl = \frac{Wl}{d}$

At the support $S. wb = W$

At any other point $S. fl = \frac{W}{d} \times (l - x)$

At any point $S. wb = W$.

Case 2. Load (w) uniformly distributed.

At the support $S. fl = \frac{w \times l^2}{2d}$

At the support $S. wb = w \times l$

At any other point $S. fl = \frac{w}{2d} \times (l \times x)^2$

At any other point $S. wb = w \times (l - x)$

Girders supported (not fixed) at both ends.

No strain in flanges at points of support.

Case 1. Load (W) at centre.

At the centre $S. fl = \frac{Wl}{4d}$

At any other point $S. fl = \frac{Wx}{2d}$

At any other point $S. wb = \frac{W}{2}$

Case 2. Load (W) at any point, dividing girder in two segments, a = the shorter and b the longer.

At the weight $S. fl = \frac{Wab}{ld}$

In the shorter segment $S. fl = \frac{W x b}{ld}$

In the shorter segment $S. wb = W\frac{b}{l}$

In the longer segment $S. fl = \frac{W x a}{ld}$

In the longer segment $S. wb = W\frac{a}{l}$

In the latter case x must always be measured from that support which is on the same side of W as the point where the strain is required.

The sections with single webs are more economical than those with double webs (box-girders), but the latter are stiffer laterally and should always be used where a great length of span requires a wide top flange.

The web of the girder must be made of such thickness that there will be no tendency to buckle, and that the vertical shearing stress per square inch will not exceed 9,000 pounds. Security against buckling is attained when this shearing stress does not exceed $\frac{10000}{1 + \frac{d^2}{3000\,t^2}}$, in which d represents the depth of web, and t its thickness in inches. The web should also be stiffened at intervals by vertical angle-irons, and at bearing ends of girder, webs should have reinforcing plates between top and bottom angle-irons.

The rivets should be $\frac{3}{4}''$ unless the girder is light, when $\frac{5}{8}''$ diameter rivets may be used; they should not be spaced more than 6″ apart and should be closer for heavy flanges, but in all cases they should not be spaced farther than 3″ or 4″ at ends for a length not less than the depth of the girder.

A strain of 10,000 pounds per square inch should be allowed both for tension and compression on the gross area of flanges.

All cast-iron columns are made with a factor-of-safety of 8.

The general formula for strength is

$$W = \frac{10000}{1 + \frac{1}{400}\left(\frac{l}{d}\right)^2} \times \text{area in inches}$$

l = length of column in inches.
d = least diameter in inches.
w = safe load in tons.

Complete tables of columns and their loads may be found in the "*Pocket Companion*" of the Dearborn Foundry Company.

Roof trusses are designed to suit shape of roof, and are usually very irregular both in shape and loading.

The strain allowed in compression members for square ends is $\frac{8000}{1 + \frac{l^2}{40000\,R^2}}$

l = length of member in inches.
R = radius of gyration in inches.

For pin and square bearings substitute 30000 for 40000 and for both pin bearings use 20000.

The strains allowed in tension members are for dead loads:

General bracings, 12000 pounds per square inch.
Wind " 14000 " " " "
Suspenders from 8000 to 10000 pounds per square inch.

Rivets are taken at 7500 pounds shearing strain and at 15000 pounds bearing value.

Pins are taken at 9000 pounds shearing strain, 14000 pounds bearing value, and 18000 pounds bending. J. E. Blackwell.

[To be continued.]

THE UNDERPINNING OF THE GREAT YARMOUTH TOWN HALL.

In 1882 a new block of municipal offices and law courts was built at Great Yarmouth, from designs by Mr. J. Bond Pearce, of Norwich. The new structure, which was illustrated in *Building News* on the 27th September, 1878, measured 132 feet by 108 feet by 50 feet high, to the parapet, with a clock-tower 110 feet high, the whole weighing about 5,000 tons, costing £30,000. Its architecture was modern Queen Anne, and its construction was red brick above string-course, and red St. Bees stone facing at base. The subsoil consisted of a gravel bank, on which was a thickness of 16 feet to 18 feet of ooze, surmounted by about five feet of made ground. The river Yare was 70 feet distant. The structure gave early indications of unequal subsidence, and in 1886 the movement apparently approached the limit

of safety, and steps were taken to underpin that portion which had settled most by the insertion of concrete blocks beneath the foundation; but the attempt was abandoned, as also was a proposal to widen the foundations by the insertion of wrought-iron needles through the brickwork, and supporting them near the ground on concrete blocks. By November last the west front of the building had sunk over a foot at its ends and eight inches at its centre, and there were some ugly fissures in it, as well as in the north wall, and the walls and tower were leaning towards the river. The Town Council, therefore, resolved to demolish the western portion of the block with the view of its being re-erected on more stable foundations. The cost of pulling down and rebuilding would have exceeded double the sum hitherto expended, and the estimated time for operations was three years.

A scheme was then submitted to the Town Council by Mr. Duckham, of the Millwall Docks, Engineer, in conjunction with Mr. James E. Teasdel, Engineer and Surveyor, of Great Yarmouth, for preventing the further subsidence of the crippled portion of the block, and lifting the portions which had settled most to the level of that which had settled least. The proposal also included the straightening of the bulged walls. The prominent features of this scheme were: First, cast-iron screw cylinders (those as adopted varied from two feet six inches to three feet diameter) placed at intervals of about nine feet inside and outside the main walls, and screwed down into the ballast, then filled with cement concrete. Secondly, double lines of wrought-iron girders II on top of the cylinders parallel with the walls. Thirdly, wrought-iron needles 14 feet to 16 feet long, mostly 16 inches by 6 inches I with a top table 12 inches wide, and averaging eight feet long, equal to width of the concrete under brick footings, passed through under this concrete foundation at intervals of about three feet six inches, and suspended at each end by two two-inch bolts from the before-mentioned II girders. The insertion of these needles and the tightening of the bolts, transferred the weight of the building from the unstable ground on to the screw-piles. The tower weighing 700 tons and having a base 20 feet square, was to be somewhat differently treated. Five special cylinders of four feet six inches and five feet diameter were proposed for this to be placed as the adjacent walls permitted. The eastern and western walls of the tower — *i. e.*, those without openings on the ground floor — to be each sandwiched between a pair of massive lattice girders below the floor-level. Needles of II section to be inserted through the walls and through the girders, and bolted up to the upper member by four two-inch bolts at each end. This proposal of Messrs. Duckham and Teasdel was adopted, after severe criticism and opposition, and a contract for the chief portion of the work was entered into by the Town Council with Mr. Thos. Gibson, of Westminster Chambers. The first cylinder was pitched at the end of May last, and the work was completed in November. The whole western portion of the block and tower are supported on a gridiron of wrought-iron joists, suspended from the girders which rest on the pile-tops. The suspending bolts have nuts at each end and 12 inches of thread; by a systematic and gradual screwing up of some more than others, the low parts of the block have been lifted to the higher level, the unsightly curves have been taken out of the building, and the tower set upright by raising its lower side. The ground has been cleared to a depth of two feet under the old concrete, and the trenches have been filled in with cement concrete, forming one mass, encasing the pile-tops, girders and bolts, thus forming a new foundation seven feet wider than the former one, irrespective of the support given by the immovable screw-piles. The tower-girders have been similarly concreted. The replacing of the floors, making good the damaged masonry and refitting in general are now being proceeded with. The damaged places in walls are being cut out through the entire thickness, the wall and windows adjoining the tower being rebuilt all in Portland cement. The subsidence in walls of main hall and tower during these operations was only nominal, and was rectified by the lifting process. What settlement did occur during the progress of the works was chiefly due to the flooding of the trenches in July last, and was at once stopped by the insertion of the cross-girder needles. The building will be ready for re-occupation by March next, the time thus occupied having been ten months, against the contemplated three years. The total cost of the work and its contingencies will be well within the estimate, £8,250. — *Building News.*

FIRTH OF FORTH BRIDGE.

THE construction of the Forth Bridge has reached a stage at which it is possible to estimate with some degree of accuracy when this gigantic engineering work will be completed; and the time given by the resident engineer is towards the end of next year. Describing the progress of the work, the *Scotsman* says that the huge "straddle-legged" structures which are reared upon the three large piers were practically completed before the end of the year. These rise to the great height of 360 feet above high-water mark, and form the *points d'appui* or structural bases from which the "cantilevers" are being built out on either side. The term cantilevers is applied to the wing-shaped structures which shoot out from the large pier-towers and reach towards one another across the great spaces that have to be spanned. The building of these cantilevers has at present reached a most interesting stage. From the summit of the towering-pier structures, arms are being stretched out on each side into mid-air. These are each composed of two pairs of huge booms, constructed on the girder or lattice-work principle, and project sheer above the waters, which are full 300 feet below. There is not the slightest under-support; the whole fabric relies upon the strength of the ties which bind it to the top of the cantilever towers. Incredible as it may appear, these top-members have been built out to the distance of 125 feet, and seem just now to hang in a precarious position like the ash upon a half-smoked cigar. It is in this part of their work that the designers and contractors claim that they have vindicated the soundness of their calculations. It was in the springing of these top-members or arms, and carrying them out unsupported the necessary distance, that cavillers and detractors of the scheme have chiefly prophecized failure. Yet from both the Queensferry and Fife pier-structures these aerial platforms have been built out, two from each, without a hitch, to the distance of 125 feet. They now await the rearing of a temporary column which is running up from below, and which will form a support, enabling them to be carried still further out till they meet the first permanent supports — the cross struts or tubes which spring from the bases of the pier-towers. The lower arms, meantime, have been proceeding even more rapidly. These are the immense tubes which protrude outward and upward, and along which the pressure exerted by the weight of the spans is carried back to the stone piers. They have been carried out to the distance of fully 160 feet. It may be explained here that the top-arms, which are constructed on the girder system, are the tension members — that is to say, are subjected to a pull by the weight of the structure which they support, while the lower arms, which are of tubular construction, are the compression members, and bear the down push, as it were. These lower tubes have been built out in exactly the same way as the upper ones — *i. e.*, without any support from underneath. The workers to-day are practically standing upon their labors of yesterday. As soon as a fresh round of steel plates is added to the tubes, or an additional girder section riveted to the top-arms, the platforms, with their freight of men and cranes and other mechanical appliances, are slid out correspondingly and a new piece of work is begun, which again when completed will give the necessary standing support for a further extension. Indeed, this is characteristic of the whole of the work at the bridge. Every piece of work done becomes the basis of another advance.

The point, however, of this great work of engineering which is of preëminent interest, and about which speculation and prophecy are most busied, is the problem of bridging over the two great spans of 1,710 feet each, which extend north and south of Inch Garvie. The largest Tay Bridge spans are just 245 feet, so that the proposed spans at Queensferry will be seven times as long. The largest span of any bridge in this country is that of the Britannia Bridge, over the Menai Strait, which is 460 feet in length, or somewhat over a quarter of the size of the Forth Bridge spans. To throw a single span across such a space as 1,710 feet would, even under ordinary conditions, be a tremendous undertaking. But in the present case the difficulties are incalculably enhanced, because the whole distance has to be bridged over without any support from below. The water is 200 feet deep on each side of Inch Garvie, so that it is impossible to found temporary scaffolding or piers upon the sea-bottom, nor can any device of pontoons be of practicable service. The problem, then, comes to be simply this — to join the Inch Garvie pier with the north and south piers (each 1,710 feet apart) by simply building straight out across the waters, at a height sufficient to allow the largest ships to pass freely up and down the Firth. It is this that explains why the immense "straddle-legged" towers which are the prominent features of the structure just now, have been reared so high as 360 feet. These great spans will never be entire — that is, the two halves of each will never be joined. Each half of each great span will hang entirely by its own supports on the main piers. Owing to the large expansion and contraction of so immense a structure of steel under changes of temperature, it would endanger the fabric were it actually joined. At a certain point in the central viaduct (as the 150-feet high girder structure along which the train passes is called) the plates will overlap each other, so that the shrinkage caused by the cold may not make a gap, nor the expansion in the hot weather cause "buckling." The extreme variation in the length of the 1,710 feet spans under alterations of temperature may not exceed nine inches, but provision is made for 18 inches. The weight of one of the spans will be about 16,000 tons. The heaviest possible addition from trains — if we take the extreme case of two coal-trains standing side by side in the middle of the span, and weighing 400 tons — would be only five per cent of the dead weight. In this way it is estimated that under a passing train the bridge will stand as stiff and firm as if the train were not there. Wind is a much more serious calculation than the trains, as with the maximum-pressure (56 pounds per square foot) the large spans be subject to an additional side-pressure of 2,000 tons. The widest margin, however, has been left in all cases.

HYDRAULIC ELEVATORS IN LONDON HOTELS. — One of the colossal hotels in London is the Metropole. An idea of its size is given by the fact of its having seventeen elevators. These "lifts" are worked by water from the mains of one of the hydraulic-power companies, of which a number are established in England. By them water under pressure is carried beneath the streets and delivered to consumers at fixed rates After doing the work required of it, the water is returned to the cen ral station of the companies, there to be used over again. — *Exchange.*

Societies

EXTRACTS FROM THE MINUTES OF MEETING OF THE CHICAGO CHAPTER, AMERICAN INSTITUTE OF ARCHITECTS, March 22, 1888.

Dinner served at 6 P. M., at conclusion of which, business meeting. Three applications for membership were favorably considered.

A printed extract from the minutes of Feb. 2d of the New York Chapter, relative to the proposed competition for the Criminal Courts' Building in that city, was read. By a unanimous vote, the Secretary was instructed to express to the New York Chapter, the hearty concurrence of Chicago Chapter in the opinions expressed in those minutes.

A communication from the Board of Trustees of A. I. A. relative to the claims of the late Thomas U. Walter against the U. S. Government was referred to a Committee.

James R. Willett, Architect, read a paper on "Graphical Statics applied to Architectural Questions." At the conclusion of the paper, a vote of thanks was moved and Mr. Willett was begged to furnish copies of his paper for publication. Carried unanimously.

Adjourned.

W. A. Otis, *Secretary.*

Notes and Clippings

Changes near the Sorbonne, Paris.—The builders, or rather the demolishers (the Paris correspondent of the London *Daily Telegraph* says), are now clearing away in order to make room for the further extensions to the new wing of the Sorbonne, another series of venerable slums. Among the first places to be improved off the face of the locality are the Rue Gerson and the greater part of the Rue Saint-Jacques. The Rue Gerson is famous as being that in which Pascal penned his Provinciles almost under the windows of the stronghold of the Jesuits. It was there that attempts were made to intimidate Pascal and to evict him from his humble tenement after his writings and books had been burned by the public executioner. In the Rue Saint-Jacques was once the famous tavern of the Cochon Fidèle, which was a meeting-place and a museum of Bohemia. There, too, were the hotel, or rather the lodging-house, which sheltered Rousseau, and the old book-shop of Mère Mansut, whose establishment was crammed with literary wares and had neither doors nor windows. The proprietress used to sleep on a pile of books and perform her ablutions in the street. When a customer asked for a volume she used to go straight to the place where it lay amid a colossal collection of other tomes. Students were sometimes in the habit of making bets as to whether or not Mère Mansut would be able to find within a given time some old volume of forgotten lore which reposed amid ancient dust in the dark recesses of her shop.

Fathomless Quicksands.—In the construction of the Kansas Pacific and Atchison, Topeka and Santa Fe Railroads, says the Wichita (Kan.) *Beacon*, one difficulty of frequent occurrence which was met with was the quicksands. From western Kansas to the mountains, quicksands are to be found in nearly every stream, no matter how small, and to successfully bridge them required an expenditure out of all proportion to the size of the stream to be crossed. Pile-driving was tried, but the longest piles disappeared without touching bottom. Then filling with earth and stone was attempted and met with equally poor success, as the quicksands were apparently capable of swallowing the entire Rocky Mountains. The only means of crossing a quicksand was found to be to build short truss bridges across them. This was very expensive, but was the only thing to be done. As instance of the practically bottomless nature of the quicksands, the case of an engine that ran off the track at River Bend, about ninety miles from Denver, on the Kansas Pacific may be cited. The engine, a large freight, fell into a quicksand and in twenty minutes had entirely disappeared. Within two days the company sent out a gang of men and a wrecking train to raise the engine. To their surprise they could not find a trace of it. Careful search was made, magnetized rods were sunk to the depth of sixty-five feet, but no engine could be found. It had sunk beyond human ken, and from that day to this has never been discovered. Cattle and horses are frequently lost, the only animal that is safe being a mule. No greater instance of the intelligence of this much-maligned quadruped can be cited than the skill and care with which it avoids all unsound bottom. As its hoofs are much smaller and narrower than those of a horse, it would mire down in places where a horse could safely pass. Recognizing this fact, whenever a mule feels the ground giving way under its feet it draws back instantly and cannot be induced to advance a step, although a whole drove of horses may have immediately preceded.

Trade Surveys

The conservative course which railroad builders, managers, investors, manufacturing interests, and jobbing and retail interests throughout the country, have pursued during the past three months have been fruitful of some beneficial results, which perhaps are not apparent on the surface. Traders and manufacturers during the past thirty days have been inclined to complain of the downward tendency in prices and to regard this tendency as a drawback, and attribute it to tariff agitations, rather than speculation, over railroad-building, overbuying and too long credits. The fact of the matter is that the downward tendency is due entirely to different causes, although the influences named may have had some effect. The business public have seemed to act with one accord during the past winter restricting purchases, and, to some extent, in restricting manufacturing operations. For instance, in the iron trade, the output has declined some 20 ovens. The Pennsylvania production suffers more than the production of any other State. In the South, the output of furnaces, mills, foundries, factories, are increasing. Throughout the West a diversified demand for the production of mills and furnaces has preserved a more healthful trade condition, and the distribution throughout the winter has been somewhat larger, *per capita*, than in the East. In fact, Pennsylvania is beginning to suffer in the iron competition with the West and South, and only last week, a meeting of influential iron-makers was held for the purpose of begging favors from the railroads to enable them to hold their own against some new sources of supply. In the textile industry, the downward tendency has been restricted to products of wool, while in cotton goods the prices have been firm throughout the season, and even an upward tendency is claimed by a good many jobbers. In the boot and shoe industry prices have been steady for sometime past, but taking the trade one thing with another, the tendency in future production is downward. The same applies to the locomotive works, car-works, general machinery work, outside of valuable patents and processes. Wood-working machinery has declined slightly, owing to the considerable increase in mill capacity. The lumber manufacturing interests, especially in the northwest, anticipate a firmer price-list this season, but sales have been made within the past two weeks, at the larger Eastern distributing centres, that show their anticipations are doomed to disappointment. We find this tendency in nearly all industries. In a few there are exceptional influences at work to strengthen prices. All this is good for consumers. The upward tendency in price would naturally restrict enterprise, while the downward tendency broadens the foundation for increased expenditures. Within the past few days a number of things have begun to bud, to show that the downward tendency alluded to has about exhausted itself. The first inquiry of the business man and manufacturer is, will prices now advance. To this, it is safe to make a positive answer, that they will not. The reasons are: first, the depleted condition of orders with manufacturers generally will make them all anxious to book business for the summer and fall. Then, again, the producing capacity has been steadily enlarged since last autumn, besides competition is more active now, and producers of all kinds of products and value are naturally anxious to secure the season's business before their neighbors. The financial question bears both directly and indirectly upon the price tendency. The business interests are slow to observe the causes at work far below the surface. In the money markets while there has been considerable increase of currency, through bond-purchases, the actual volume of available *per capita* circulation, is less than it was two or three years ago, as measured by the business requirements. One evidence of this, is in the great increase in obligations made. Another evidence is shown in the increasing volume of money borrowed for Western farm, manufacturing and general business requirements. Another is the increasing volume of book-indebtedness between retailers, jobbers and wholesalers. There are a great many complaints of a scarcity of money in small trading circles, but no immediate harm can grow out of this, but the ultimate possibilities are that the declining supply of money will be felt seriously in trade, financial and manufacturing centres. This is a matter to which the law-making power of the country should give its careful attention, but to all appearances this vital question will remain for future consideration.

Building operations in a good many States have been rather sluggish. In Philadelphia the volume of new business is thirty per cent less than at this time last year. In Pittsburgh, thirty-five per cent, in St. Louis twenty to twenty-five per cent. The projected work in a number of cities west of the Mississippi River is even larger than last year, although there are some doubts as to whether all the work projected will be undertaken before May 1st. By that time an intelligent opinion can be expressed. One encouraging featnre is that the brick-makers have sold all their stock, and have orders for more. Another is that manufacturers of building-hardware have made large contracts and are pretty well sold up. Nails have begun to move freely, and nail-makers speak well of the coming season. Contracts for shingles, laths, slate and a variety of products entering into building construction, show that in a general way building activity will not fall much behind last year if any, especially for the next three months. The workmen, except in a few cities in the West, are returning to work at old prices, and there will be no labor outbursts. Indications from Eastern and Western mining regions show that the production of coal will be fully as heavy as last year. Some of the older fields will produce less, but the spread of industries throughout the West will increase the demand in the new quarters. The mines of the South will increase their output by twenty-five per cent. Mines west of the Mississippi will be worked to their fullest extent. Makers of mining machinery are authority for the statement that mining operations will be developed on a large scale. The company producers are quarrelling among themselves, and the stronger faction is crowding the weaker to the wall for the purpose of compelling it to agree to an advance of $1.25 to $1.50 per ton at ovens. Within twelve months the coke-making capacity will be increased by two thousand ovens. There will be greater diversification of industries in the West this year than last, stimulated largely by the capital, which has been and will be borrowed for the purpose of planting new industries and enterprises along the line of the new roads. Railroad-building prospects at this time are far from favorable, yet there are a number of large enterprises projected within the past thirty days. It is needless to say that this will be a poor railroad-building year, though no one can speak with any certainty. There is an abundance of quotable stock for investment, and there is certainly much room for additional mileage, and the only safe opinion to entertain is that much building will be done. There are lots of small roads projected between the Atlantic and Mississippi to develop good traffic-producing territory in those States. Railroad-building is in its infancy yet, and the year 1888 will develop much more enterprise in that direction than is now apparent. The managers of other lines contemplate the construction of factories, and two or three roads are now entering upon that work. A great deal of railroad material will be contracted for within the next sixty days. Bridge-work will be prosecuted on an extensive scale. Within a few days the Pennsylvania structural iron-makers have received inquiries for several very large lots of material. The Standard Oil Company will build a two hundred mile pipe line, and if their projected operations are prosecuted, the mileage this year will reach between seven and eight hundred miles. Demand will come from unexpected sources. Those who were pretending to predict as to the volume and course of trade this season are astray simply because of the difficulty of forseeing all of the multitudinous requirements which a country like the United States is constantly creating.

S. J. Parkhill & Co., Printers, Boston.

THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. XXIII. No. 642.

Copyright, 1888, by TICKNOR & COMPANY, Boston, Mass.

APRIL 14, 1888.

Entered at the Post-Office at Boston as second-class matter.

CONTENTS

THE New York *Star* gives an amusing description of the moving of the Brighton Beach Hotel, at Coney Island, perhaps the largest building that was ever moved in one piece, even in this country of migratory houses. The hotel, which is a wooden structure, very nearly five hundred feet long, and four stories high, was attacked last winter by a severe storm, which washed away the sand around it, leaving it standing in the water, and in imminent danger of destruction in case of exposure to another storm. It was therefore decided to move it bodily inland, as soon as the weather should permit, and last week the operation was successfully performed, under the direction of Mr. D. C. Miller, of New York. The first step was to shut out the water by a coffer-dam of sheet-piling. A forest of jack-screws was then inserted carefully under the building, and the whole mass slowly raised about eight feet, and securely blocked. Next, twenty-four lines of railroad track were constructed, running beneath the building, and extending in the direction of its proposed movement. After these had been firmly laid, levelled and ballasted, twenty-four trains, comprising one hundred and twelve flat-cars, were run under the hotel by a spur-track from the neighboring line, and heavy timbers were placed across from car to car, so as to form a platform capable of sustaining the building. When all was ready, the jack-screws were slacked, the mass lowered upon the platform, and the blocks taken away. All was then ready for the journey. The motive power consisted of six engines, attached to ropes, with sheaves which multiplied the force of each about eight times. Naturally, some anxiety was felt lest the locomotives should not start together, the consequence of which would be the serious straining of the structure, but by judicious signalling, and careful management of the ropes, the movement was made quite uniform, and it was transported with perfect success some two hundred feet inland, towards a new position out of reach of the sea. So gentle was the movement, and so slight the strain, that neither plastering nor window-glass was cracked, and the furniture, even to the crockery, kept its place without harm. The whole distance to be traversed is about six hundred feet, but as the new foundations are not quite ready, the latter part of the trip will be delayed a few days.

THE death of Mrs. Lucy Myers Mitchell ought not to pass unnoticed by any journal which interests itself in the fine arts. Mrs. Mitchell was born in Persia, where her father, the Rev. Austin H. Wright, was missionary to the Nestorians. She was sent to the United States to be educated, returning to Persia only for a year's visit when a school-girl of nineteen. In 1867 she was married to an artist of Morristown, N. J., Mr. S. S. Mitchell. The greater part of her married life was spent in Europe, and at Leipsic she became interested in Classic archæology and devoted herself to the study of this subject in Berlin, London and Rome. Her first notable publication was a series of articles on Greek sculpture in the *Century Magazine*, which attracted great attention, and soon afterwards she published in New York a very valuable "*History of Ancient Sculpture*," which won for her the distinction of membership in the Imperial Archæological Institute of Germany. While engaged in the collection of materials for a second book, her health failed, and, after a long illness, she died in Berlin in March last.

IT is not often that the English Church Establishment has a good word said for it in this country, but one must acknowledge that there is something valuable in the idea that the official clergy of a parish are bound to look out for the temporal as well as the spiritual welfare of all the inhabitants of the parish, whether they belong to their communion or not. Of course, we do not claim that all the English clergy fulfil their theoretical duty in this respect, but some of them undoubtedly try to, and to the labors of such men as Kingsley, Haweis and a dozen others the English poor owe a great deal in the way of increased bodily comfort, whether their souls, for whose sake the work was attempted, have profited by it or not. For all their efforts, however, a great deal remains to be done, and it will be long before the need of organized and judicious charity ceases to exist. According to some statistics collected by Dr. J. B. Russell, of Glasgow, and quoted in the *British Architect*, the population of that city is more crowded than that of any city in the United Kingdom except Liverpool, being eighty-four to the acre, while Liverpool has one hundred and six. Of course, like all British towns, a considerable part of Glasgow consists of detached dwellings, which contain a small number of persons to an acre of ground, but the average is kept up by the tenement-house districts, in which the population is three hundred and forty-eight to the acre, or about one person to every eleven feet square. In the proportion of tenement-houses Glasgow exceeds even New York. Out of every one hundred dwellings occupied by a family, thirty consist of only one room; forty-four have two rooms, fourteen have three, and only twelve have more than three. To put the case in a different way, one-quarter of the population lives in tenements of one room, and seventy per cent is crowded into dwellings consisting of not more than two rooms; while only eight per cent of the inhabitants live in houses of five or more rooms.

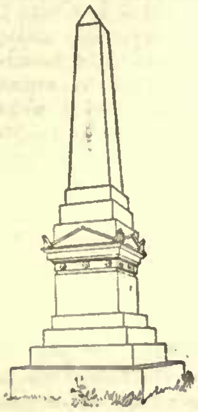
IT is hardly necessary to say that in the districts occupied by the small tenements the well-known evils due to overcrowding flourish. Diseases of all kinds, particularly those of the lungs, and children's diseases, carry off annually about five per cent of the dwellers in tenements, while the yearly mortality in the districts with large houses is only about one-third as great. Of little children, especially, five times as many, in every hundred, die annually in the tenement-houses as in the detached mansions, and one-fourth of all the children born there do not live to the end of their first year. Every month, on an average, three babies are smothered by having their drunken mothers roll over upon them, and no small proportion of them are sent out of the world by having whiskey administered to them. Bad as the present state of things is, however, it is much better than it once was. Twenty years ago the name of Glasgow was a by-word for the misery and degradation of its inhabitants. Out of a population of less than four hundred thousand, one hundred and forty-five thousand, or thirty-seven per cent, lived in dwellings of one apartment. In some districts the number of inhabitants, crowded in huge barracks on dirty and crooked alleys or "wynds," reached one thousand to the acre, and seven out of every hundred died annually. In 1867–68, by authority of Parliament, the city was authorized to carry out extensive improvements, and, at a cost of about two million dollars, it widened and extended streets, demolished the worst of the old barracks, and brought

light and air into depths where disease and crime had been for centuries undisturbed. At present, with a population of considerably more than half a million, the number of occupants of single-room dwellings is less than it was in 1861, while more people live in flats of two or three rooms than ever before. This in itself is a great gain. Where the young girls of a family are compelled to sleep in the same room with drunken boys, feminine modesty and virtue have but a small chance, and without these there is not much to be hoped for from a family in the way of neatness, economy and the other domestic graces. That these should be able to exist at all, as they undoubtedly do, among the helpless Glasgow women, as among the poor women of all other large cities, is an honor to the sex, and persons who enjoy a considerable share of the good things of this world would do well to ask themselves occasionally how steadfastly they would be capable of maintaining the decent habits in which they have been brought up if they should have to change places with their humble sisters; and whether they ought to take undiluted pride in the reflection that Providence has found it advisable to place them where they will have only rare and small temptations to encounter, and has chosen to show as nearly all the examples of heroic self-sacrifice, of unflinching courage and integrity, and of angelic purity, the poorest of the poor. Notwithstanding the sneers of the persons who talk about the uselessness of providing improved dwellings for people who prefer crowding and dirt, there is no question that for the sake of the women and children the law should give no choice in the matter. Nine-tenths of the women in the world, however warmly they may advocate the superior economy of one-room dwelling, wish to be sometimes by themselves, and are better and happier, and more useful, for enjoying this privilege; while children ought to have no choice at all in the matter until their moral sense has been sufficiently developed to fortify them against the corrupting influences of overcrowding. The families which can be virtuous in one room can be equally so in two; and many can be so in two which could not in one; and to that extent the public authority should be exerted. From London, Paris and New York, as well as Glasgow, the report of those who are qualified to speak on the subject is that one-room tenements expose their occupants to moral temptations and degradation, as well as physical influences which few can wholly withstand, and it is quite time that they were taken vigorously in hand.

MR. E. J. TARVER, an English architect of considerable distinction, has invented and patented a new type of theatre construction which presents many points of considerable professional interest. Unlike the plan devised by Mr. Henry Irving and Mr. Alfred Darbyshire, which, although well suited for entertaining a small audience in comfort and security, requires a site open on all sides, and provides but one gallery, Mr. Tarver's scheme is adapted to a site open only on one side and includes three circles or galleries in addition to the pit, or, as we should call it, the parquet-circle. Moreover, the space is so well economized that with an area exactly the same as that occupied by an existing London theatre, which seats seven hundred and sixty-six persons, Mr. Tarver accommodates twelve hundred and fifty persons with seats remarkably well arranged for seeing and hearing, leaving at the same time ample space for staircases, vestibules, foyer, or "saloon" as he calls it, parlors, and so on. The general idea of the arrangement, as Mr. Tarver frankly says, is borrowed from the Roman amphitheatre. Every architect is familiar with the plan of the Coliseum, for instance, in which the space under the sloping ranks of seats is occupied by corridors and staircases, the number of corridors diminishing as the height from the ground increases, and the space for them is lessened by the setting back of the rows of seats. It will be remembered also that access was obtained from the Roman corridors to the seats by means of passages cut through from each corridor to the front row of seats at that level, so that the spectators reached their places by coming first to the front and then climbing back from this point to the seat allotted to them something after the method still in use in travelling circuses. As in the circuses, so in the Roman amphitheatres, this disposition of passage-ways lent itself admirably to the rapid reception and dispersion of enormous audiences, and Mr. Tarver has adopted this principle as the basis of his plan. Entering the building from the street, a large vestibule first presents itself, with box-office in front, doors to the first circle on each side of the box-office, and at either end staircases to the circle above, which has also two separate street entrances. The staircases to the upper gallery, together with those to the pit, are situated outside the vestibule at either end, and are reached from the street by separate entrances. This arrangement is often adopted abroad, to keep the rabble who occupy the cheap seats in the pits and gallery from mixing in the vestibule with the people on their way to the better parts of the house, and Mr. Tarver accepts it, not only from this motive, but as an important part of his plan for avoiding crowding and confusion in case of fire.

THE second circle extends back over the box-office and other dependencies, so that, although it has only a balcony front, extending by means of cantilevers a short distance over the circle below, and requiring no columns to support it, it gives a large number of seats admirably situated for seeing and hearing, besides leaving room for the "saloon," with ladies' parlor at one end and gentlemen's room at the other, between it and the front wall. Over this, arranged in the same way, is the gallery, which extends to the street wall. The disposition of successively-retreating circles must give the theatre an aspect of openness and lightness very different from that of ordinary theatres, in which all the devices of the decorator need to be employed to dissimulate the sombre effect caused by the zones of deep shadow under the various galleries, while the approach of the lower seats to the stage is very advantageous both for seeing and hearing, and the gallery seats, although farther from the stage than any others, may for that reason be placed on a grade much less steep than usual, and are consequently more comfortable. As in the Roman amphitheatres, the staircases from below deliver the persons coming in near the front of their respective galleries. One row of seats is left next the balcony fronts, but behind this is an aisle through which the new-comers walk, looking at the ranges of seats above them until they see their own number. At first sight it would appear that the passing of persons arriving late in front of all the seats in their circle except the front row would be an annoyance to those who were already in their places, but by raising the seats back of the aisle, all those behind it can see over the heads of people walking in it, while the circumstance that those who come in can see all the numbers on the chairs at a glance must assist greatly in getting them quickly and quietly seated without calling in the aid of talkative ushers or other guides. Moreover, in case of fire, the occupants of each circle, having had the exit pathway in front of them all the evening, could not fail to start in the right direction in their rush for the doors, no matter what panic might exist, and, having gained the aisle, instead of converging to one point, as happens where a single staircase gives access to a long corridor, the people divide, some going to one of the side staircases and the others to the other. Once arrived at the stairway they are safe. Each stairway, though compact, is open to the outer air and shut off by heavy walls from all the rest of the theatre. Landings are frequent and the turns gradual, and a frantic rush or a blockade of any portion is hardly possible. Although a theatre built on an isolated site, with many entrances and stairways on all sides, would undoubtedly be safer than any building which could be erected on a lot hemmed in on all except the street side, Mr. Tarver's plan shows that one even under these circumstances can be made much safer than most of those now in use, while the cleverness with which he has secured this result, at the same time with extraordinary seating capacity, brilliancy of internal effect, perfect acoustic quality and convenience for seeing, and liberal provision for accessory rooms, shows, to our mind, the success with which such a problem can be solved by a thoroughly-trained architect if he is allowed to manage it in his own way. Of course very few architects are allowed, in designing theatres, to depart from the stereotyped arrangement with which managers and actors are familiar, and still fewer, if they were permitted to do so, would bring to the work the skill, as well as the profound study of the conditions displayed by Mr. Tarver, but after the remarkable merits of his scheme have been digested by future theatre proprietors, and, we may hope, utilized by adopting his plan, there will still be plenty of work to be done in arranging details for different conditions, for which the best architectural talent will be needed.

MEMORIALS TO CAPTAIN NATHAN HALE.—I.



Hale Monument at Coventry, Conn. Henry Austin, Architect.

IF there is on record no nobler expression of pure patriotism, than the quiet words uttered by young Captain Nathan Hale a moment before his life went out on the gibbet as a spy, so, there is no more sorrowful history than the lack of fitting remembrance, by his military associates and countrymen, of his voluntary and heroic immolation upon the altar of his country.

Hale was born in Coventry, Connecticut, June 6, 1755. His family was eminently Puritan in its faith, tastes, and manners. All accounts agree that Hale himself was a person of superior character and attainments in all respects. He was graduated from Yale College, in 1773, and was intended, by his father, for the ministry. He taught school from the time of his graduation until the news of the battle of Lexington arrived in New London, Connecticut, where Hale was then teaching. The citizens at once assembled in town-meeting and passed resolutions in favor of resistance to the mother country. Hale was one of the speakers at this meeting, and in his address he spoke the following words with such emphasis and eloquence that they surprised even those who heard them. "Let us march immediately, and never lay down our arms until we obtain our independence." It is believed that Hale was the first colonist to use this word "*independence*" as the ultimate desire of those who opposed the claims of Great Britian. He immediately enrolled himself as a volunteer in an independent company, wrote to his father that "a sense of duty urged him to sacrifice everything for his country," bade farewell to his pupils, and set out for the scene of action. Returning soon after to New London, he joined, as lieutenant, a company belonging to a State regiment, and remained there until September, when his regiment marched to Boston. In January, he was commissioned as captain, by the Continental Congress, and served in the brigade of General Spencer around Boston, until the following April, when he went with the troops under General Heath to New York. While in the vicinity of Boston he distinguished himself as a military student, and a most thorough and humane disciplinarian. His own company became a model for others, and its excellence was noticed with commendations by his superior officers. When in November, 1775, the army was threatened with dissolution by the expiration of enlistments, Hale rendered conspicuous service; he cheered General Lee and other officers when sadly cast down by the prospect, and going around in person to the men urged them, by every patriotic consideration which he could devise, to remain and fight the battles of their country. Not content with this, he promised his own company his personal wages if they would remain, and to make his pledge good he borrowed money on the credit of his own advance pay.

When in New York he had but one opportunity of signalizing himself, before the event which brought him immortal fame. This was the capturing of a British sloop, laden with supplies, which was anchored in the East River under the protection of the sixty-four gun ship "*Asia.*" After the disastrous battle of Long Island had been fought, August, 1776, the American troops, filled with despair, retreated to the island of New York. As if the thunder of the British arms had deafened their ears to the solicitations of patriotism, the militia began to desert by companies and even by entire regiments; of those that remained, fresh as they were from the workshop and the field, a large portion were impatient of restraint, and clamorous for pay—one-fourth of them were on the sick-list, one-third were without tents. They had clothes, shoes and blankets only for a summer campaign, and winter was approaching, food and forage were difficult to obtain. The military-chest was entirely empty of money, and had been so for two months. In positive suffering from want of supplies, without confidence, without subordination, importunate in complaints, the American army—fourteen thousand only fit for duty—lay, in the early part of September, 1776, stretched along from the Battery to Kingsbridge, detached, agitated, and full of gloom. And facing them, from the extreme southern point of Long Island to a point opposite the Heights of Harlem, posted at all available places, riding in ships and transports, was arranged a British army of not less than twenty-five thousand men, magnificently equipped with warlike materials of every kind, under the command of able generals, now in the first flush of victory, and there for the special purpose of "looking down and forever ending the opposition of the rebels."

What would be General Howe's next step was a question of infinite importance to Washington and his enfeebled and dispirited army: of a dozen projects which the British commander might attempt to carry out, not one could be surmised by Washington, nor could he procure the least information. And yet, the fate of the American army depended upon the possession of the knowledge of where the enemy would make its attack, in order that timely preparations could be made to repel it. Every effort was made by the American commander, by scouts and by offered bounties to British deserters, to obtain some precise information of the enemy's designs. But all in vain. It was the policy of Howe to deceive, and thus far he had succeeded.

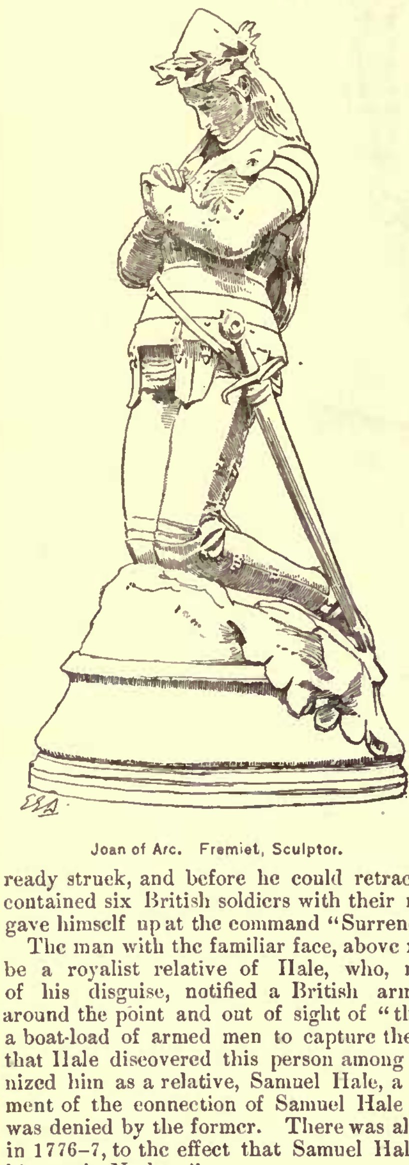
Some one, thought Washington, must go into the British camp and find out its intentions, or the American army was lost, and he communicated this opinion to his board of officers. The board agreed fully with the views of the commander-in-chief, and Colonel Knowlton was instructed to select some competent person for the hazardous undertaking, Of the character of this undertaking, Hon. J. M. Stuart, in his "*Life of Hale,*" observes: "An office not alone hazardous. What else was it? To appreciate the position of Hale, it is necessary to dwell a moment upon it. It was an office also ignominious. In the judgment of every civilized nation, in the eye of all national law, the use of spies is deemed 'a clandestine practise and deceit in war.' It is a fraud unworthy of an open, manly enemy, scarcely redeemed in motive by any exigency of danger, and pregnant with the worst mischief in stimulating, from a sense of betrayal, the vengeance of the enemy, and undermining those sentiments of honor, which, like dry shoots of sunlight upon a thunder-clouded sky, tend to soften the blackness of war. The spy is the companion of darkness. He lurks, he hides, or if he moves in the light, it is behind walls, in the shadows of trees, in the loneliness of clefts, under the cover of hills, in the gloom of ditches, skulking with the owl, the mole or the Indian. Or if he enters the camp of an enemy, he insinuates himself, and winds treacherously into confidence. Caught, his sure penalty is the halter. 'Nathan Palmer, a lieutenant in your King's service,' wrote General Putman, from his camp at Peakskill to Governor Tyron, 'was taken in my camp as a *spy*, he was tried as a spy, and you may rest assured, Sir, he shall be hanged as a spy. P. S. Afternoon. *He is hanged.*' This pithy, laconic epistle, communicating the fate of one tory agent of the sort of which we speak, during our Revolution, only too truly describes the quick aversion, particularly of soldiers, to all those who disguisedly enter a military camp to bear off its secrets to an enemy, and the speed with which such persons pass from capture to the gallows. And yet, notwithstanding all this, the employment of a spy in some crisis of the last importance is not judged unworthy of a great commander. His success is thought most meritorious, and is followed, if not preceded, by honors and rewards. Only a sovereign may not ordinarily command the service, so is it deemed disgraceful, but save from an enemy's subjects he may accept it when voluntarily offered, 'without offence to honor or justice.'"

The exigency of the American army would not permit the employment, in the service proposed, of any ordinary soldier, unpractised in military observation and without skill as a draughtsman, least of all of the common mercenary, to whom, allured by the hope of large reward, such tasks are usually assigned. Accurate estimates of the numbers of the enemy, of their distribution, of the form and position of their various encampments, of their marchings and counter-marchings, of their concentration at one point or another of the instruments of war, but more than all, of their plan of attack, as derived from the open report, or the unguarded whispers in camp of officers or men; estimates of all these things, requiring a quick, a cool head, a practised pencil, military science, general intelligence, and pliable address, were to be made.

Colonel Knowlton, therefore, made a personal appeal to the officers of his own and other regiments, assembled for the purpose, and in the name of Washington, and the cause of their country, urged them to undertake the task. It was too irredeemably humiliating to play the spy; an officer could not do it: all declined. The colonel's case seemed hopeless. What was to be done? How could he face his commander? "Suddenly, from the group of reluctant, half-resentful officers, at the moment when all hope for the enterprise seemed lost, and the heart of Knowlton, saddened with the thought of future misfortune, was fast yielding to the torture of disappointment, there came a voice with the painfully thrilling, yet cheering words—'I will undertake it!' It was the voice of Captain Nathan Hale. He had come late into the assembly of officers. Scarcely yet recovered from a severe illness, without his accustomed strength of body, yet firm and ardent as ever of soul, he volunteered at once, reckless of its danger, to discharge the repudiated trust. His fellow officers urgently remonstrated against his decision, by every argument they could bring to bear, and none with more persistence than Captain, afterwards General, William Hull, who was Hale's companion in college, and his intimate in camp. To all of which Hale replied: 'I think I owe to my country the accomplishment of an object so important, and so much desired by the commander of her armies, and I know no other mode of obtaining the information, than by assuming a disguise and passing into the enemy's camp. I am fully sensible of the consequences of discovery and capture in such a situation. But for a year I have been attached to the army, and have not rendered any material service, while receiving a compensation for which I make no return. Yet I am not influenced by the expectation of promotion or pecuniary reward. I wish to be useful, and every kind of service necessary for the public good becomes honorable by being necessary. If the exigencies of my country demand a peculiar service, its claims to the performance of that service are imperious.'"

Receiving, as it is affirmed, from the commander-in-chief in person, particular instructions, and a general order upon all the American sloops or other vessels in the Sound to convey him across to any point upon Long Island which he should designate, Hale, about the middle of September, carrying with him materials for a disguise, and accompanied by Stephen Hemstead, a trustworthy soldier of his own company, left the camp at Harlem Heights intending to cross the Sound at the first opportunity. But as the enemy's vessels were constantly

cruising along the East River and up the Sound, and its scouting and foraging parties lined the shore of Long Island, Hale and his companion were obliged to go as far as the neighborhood of Norwalk, nearly fifty miles, before they found a friendly sloop to carry him across to the opposite shore. Putting on the costume of a country schoolmaster, and bidding his comrade to await his return, he set sail for the head of Huntington Bay. Although he was familiar with the character and costume of a schoolmaster, and could appear with ease and self-possession in this disguise, and also carried with him his college diploma, he was now to pass into a locality occupied and mostly controlled by the British and their abettors. Crossing the Sound he landed at a point, then and now known as "the Cedars." Near by stood the house of Widow Rachel Chichester, or "Mother Chich," who, herself a royalist, made her house a rendezvous for all the tories of the region. Hale passed this place in safety, called at the dwelling of William Johnson, who received him confidentially, ate a hearty breakfast, rested a few hours and proceeded on his way. It is known that Hale was successful in obtaining the desired information, that he visited safely the enemy's camp, studied its fortifications, and returned to "the Cedars" early in the morning of the twenty-first of September, 1776. Emboldened no doubt by his hitherto good fortune, and feeling secure in his disguise he entered, it is affirmed, the tavern of "Mother Chich." Of his arrest, which took place an hour or two later, there are two accounts.



Joan of Arc. Fremiet, Sculptor.

One on the authority of Doctor Ray, of Huntington, Long Island, says that while Hale was sitting in the house "*a man with a familiar face left the room*," and very soon after Mother Chich suddenly announced to her guests that a strange boat was seen approaching the shore. The news produced consternation among the loyalists, and they ran away as fast as they could, while Hale concluded that it was the boat intended to carry him across to Norwalk where he had left Hempstead. He accordingly hastened to the shore, where the boat had already struck, and before he could retrace his steps, he saw that it contained six British soldiers with their muskets pointed at him; he gave himself up at the command "Surrender or die."

The man with the familiar face, above referred to, was affirmed to be a royalist relative of Hale, who, recognizing Hale in spite of his disguise, notified a British armed vessel that was lying around the point and out of sight of "the Cedars" and which sent a boat-load of armed men to capture the spy. It was also affirmed that Hale discovered this person among the boat's crew, and recognized him as a relative, Samuel Hale, a royalist. The above statement of the connection of Samuel Hale with the arrest of Nathan, was denied by the former. There was also a report exactly opposite, in 1776–7, to the effect that Samuel Hale "strove earnestly to save his cousin Nathan."

The other account of the capture is, that Hale arrived in the vicinity of "Mother Chich's" house early in the morning, and was on the watch for an expected boat which was to carry him across the Sound; and that seeing one approach the shore, he walked confidently towards it, supposing it to be of a friendly character, when lo! to his utter surprise, as it struck the shore she proved to be British. He attempted to retrace his steps, but the imperious summons to surrender, and the levelled muskets, caused him to stop. Escape was impossible. He turned, gave himself up, went on board the boat, and was transferred to the vessel above mentioned as lying near by. It was a guard-ship, the "*Halifax*," Captain Quarme, sent there to protect a body of men who were cutting wood for the British garrison at New York.

Captain Quarme suspected that Hale was a spy, and his suspicions proved true, for on searching him the plans and memoranda he had made were found in his shoes. The textual explanations were written in Latin. Captain Quarme treated Hale with kindness, and said that he regretted "that so fine a fellow had fallen into his power." Hale was at once sent to New York, in one of the boats of the "*Halifax*," — arriving there in the midst of a great fire that consumed nearly five hundred houses, or almost one-third of the city — and was conducted to the presence of General Howe, whose headquarters were at the mansion of James Beekman, at present the corner of Fifty-First Street and First Avenue. There, Hale frankly and at once acknowledged his mission, confessed himself an American officer and a spy, stated his success as such, expressed his regret that his hope of serving his country was now cut off, and calmly awaited the decision of his judge. That decision was soon made. It was that William Cunningham, Provost Marshal of the Royal army, was directed "to receive into his custody the body of Nathan Hale, a captain in the Rebel army, that day convicted as a spy, and to see him hung by the neck until dead, tomorrow morning at day-break."

Where Hale spent the night, whether at the headquarters of General Howe, or those of the Provost, in what is now the Hall of Records, is not positively known. It is only known that he was seen at the latter place the night before his execution. It is known that he received the usual treatment, the cruelest, meted out by Cunningham to all his unfortunate prisoners. All authorities agree that Cunningham, a renegade Irishman, was a most brutal ruffian, and that his acts exceeded the worst of all those that disgraced the British forces during the war. He refused, with curses, Hale's request for permission to write to his family, or to have a Bible. The young lieutenant, however, of Hale's guard interfered in the latter's behalf, and procured him the privilege of writing. As the morning approached Cunningham found Hale ready, and he handed to the former the letters he had written to his family and to his betrothed. Cunningham read them, and furious at their contents, and for the reason, afterward given by himself, "that the rebels should never know they had a man who could die with such firmness," tore them to pieces, and ordered his victim to begin his death march.

On the way to the gallows Hale was taunted with the ignominy of death by the halter. An English officer, who stood near the cart of execution, remarked that "This was a fine death for a soldier." "Sir," replied Hale, lifting his cap, "there is no death that would not be rendered noble in such a glorious cause." As he was about to be pushed from the ladder, that supported him, into eternity, Cunningham scoffingly demanded his dying speech and confession, Hale exclaimed, in a full, clear, distinct voice, as the immortal testament of his heroic soul to the world he was leaving — 'I only regret that I have but one life to lose for my country."

Maddened to hear an expression so sublime, from the lips of his victim, and to witness so many visible signs of sympathy for him from the crowd, Cunningham instantly shouted, "swing the rebel off!"

It is not known exactly when Hale was hung or where he was buried, but it is believed that the gallows was near the jail, or Hall of Records and that he was buried near by.

The news of his death was conveyed to Washington, by Colonel Montaznar, under a flag of truce, and through the hands of Alexander Hamilton. How Washington felt about it is not known. Nor is it known that either he, or any of Hale's military comrades, or friends, communicated the awful news to Hale's family or uttered a word of sympathy or condolence. It is certain that for a long time his family did not know the exact date of his death. This appears all the more surprising and heartless, because soon after, when the British spy, André, was taken, there was a general commotion in the army to which he belonged, a lengthy correspondence between Washington and Howe, and a great deal of sympathy shown to the Briton, by Americans as well as royalists. Some persons have attempted to excuse the silence of Washington, and the after forgetfulness of Hale by his brother officers. But the sad fact remains, it was the beginning of that oblivion which claimed Hale's memory as its own from the moment of his capture.

Neither is it known by what means Hale's parents heard of his death. When the news did reach them, "it almost killed his father and mother." Hale's servant, Asher Wright, was never of sound mind after the death of his master. And his betrothed, Alice Adams, resolved never to marry.

An American officer, writing a letter from Harlem, in September, 1776, which was published in the *Boston Gazette* of October 7, says, "One *Hale*, on suspicion of being a spy, was taken up and dragged without ceremony to the execution post, and hung up."

The gazetteers of the day made little more than the most meagre mention of him. In Spark's "*Life of André*," there are a few paragraphs, and a few in Thompson's "*History of Long Island*."

Thirty-three years after his death, a brick fort, long since in ruins, was built in New Haven Harbor, and named after him. A simple rude stone, was erected by the side of his father's grave, in the Congregational burying-ground in Coventry, bearing this inscription — "Nathan Hale, Esq., a Captain in the Army of the United States, was born June 6, 1755, received the first honors of Yale College, Sept.; 1773, and resigned his life a sacrifice to his country's liberty at New York, Sept. 22, 1776, aged 22." An entry was also made in the town records of Coventry by his brother, Major John Hale, as follows — "Captain Nathan Hale the son of Deacon Richard Hale was taken in the city of New York by the Britons and executed as a spie sometime in the month of September, A. D. 1776."

In November, 1837, the citizens of Coventry and vicinity, and many in Connecticut who cherished the memory of the martyr, united in forming the "Hale Monument Association," for the purpose of erecting a cenotaph to his memory. Previous to this, however, Congress had been appealed to — no less than eight successive years — to, at least, assist in erecting a monument. But every appeal was in

vain. It could erect memorials to Montgomery, Nash, Mercer, DeKalb, Gerry, Brown, and others, and vote farms and annuities to the captors of André, but not a dollar to remember Hale. It could vote busts, and swords, and medals by the score, but Hale's name received no welcome echo.

The Hale Monument Association appealed to private patriotism, and depended upon individual effort.

Under the leadership of Mr. J. W. Boynton, the secretary of the association, private subscriptions were obtained, fairs were held, plays were written and acted, musicales were given, and every other device practised that patriotic love could contrive, until nearly two thousand dollars were raised. The State gave twelve hundred and fifty dollars. In all the exertions made to collect this amount of money, none equalled that of the ladies of Coventry and Hartford. A song was written by Miss J. Root, of Andover, Connecticut, addressed to the "Daughter of Freedom," and was sung by the Coventry Glee-Club — the first verse ran thus:

"She came with choicest flowers
To deck a hero's grave,
To shed the light of love around
The memory of the brave."

A drama in five acts, was written by Mr. David Trumbull, and exhibited with accompanying tableaux in the meeting-house in South Coventry.

The monument was completed in September, 1846, at a cost of three thousand seven hundred and thirty-three dollars and ninety-three cents. It was designed by Henry Austin, a New Haven architect, and built under the supervision of Solomon Williard. It is made of Quincy granite, and is forty feet high. The various railroads, running from Quincy to Norwich, Connecticut, transported the granite free. Mr. Nathan Hale, of Boston, nephew and namesake of the patriot was nobly active in the erection of the monument.

The inscription consists of Hale's name, title, date of birth and death, and his last words.

Hale's fate has been occasionally mourned by the Muse of Poetry and the pen of the epitaph writer. A beautiful example of the latter was written by Mr. George Gibbs, formerly Librarian of the New York Historical Society. It is as follows:

"Stranger Beneath this Stone
Lies the dust of
A Spy
who perished upon the Gibbet
Yet
the Storied marbles of the Great
The Shrines of Heroes
Entombed not one more worthy of
Honor
than Him who here
Sleeps his last sleep.
Nations
bow with reverence before the dust
of him who dies
a glorious Death
urged on by the sound of the
Trumpet
and the shouts of
admiring thousands
But what reverence, what honor
is not due to one
who for his country encountered
Even an infamous death
Soothed by no sympathy
animated by no praise.

In 1849, two chapters of the Order of United Americans were instituted and named after Hale. A monument was also proposed to be erected by some citizens of Brooklyn, N. Y.

In 1853, at the centennial meeting of the Linonian Society of Yale, of which Hale was a member, Francis M. Finch read a poem on Nathan Hale. This is the first verse:

To drum-beat and heart-beat,
A soldier passes by;
There is color on his cheek
There is courage in his eye;
Yet to drum-beat and heart-beat
In a moment he must die.

Another:

Neath the blue morn, the sunny morn,
He dies upon the tree;
And he mourns that he can lose
But one life for Liberty;
And in the blue morn, the sunny morn
His spirit wings are free.

The last verse:

From fame-leaf and angel-leaf,
From monument and urn,
The sad of earth, the glad of heaven,
His tragic fate shall learn;
And on fame-leaf and angel-leaf
The name of Hale shall burn.

In 1856, the Hon. J. W. Stuart, of Hartford, published a "*Life of Hale*" including all attainable facts concerning him. At the end of the volume he prints more than forty notices of his book, from historians, scholars, statesmen, and newspapers. In all of them there is not a single expression of enthusiasm, not a phrase of inspiring appreciation, not a word of awakening of what Hale really was.

Switzerland receiving a wounded French Soldier.

Within a year or two Mr. B. J. Lossing has published a book, entitled "*The Two Spies.*" Referring to the Hartford project, of which I shall soon speak, he very sensibly recommended that the superb epitaph by Gibbs, should be cut upon the pedestal.

The late Hon. H. J. Raymond, in his address, October 7, 1853, at the dedication of the monument to commemorate the capture of André, in Tarrytown, N. Y., paid Hale a beautiful and eloquent tribute.

"The loving hearts of Hale's early companions have erected a neat monument to his memory in his native town; but beyond that little circle, where stands his name recorded? While the Majesty of England in the person of her Sovereign, sent an embassy across the sea to solicit the remains of André at the hand of his foes, that they might be enshrined in that sepulchre where she garners the relics of her mighty and renowned sons — 'splendid in their ashes and pompous in the grave' — the children of Washington have left the body of *Hale* to sleep in its unknown tomb, unhonored by any outward observance, unmarked by memorial stones. Monody, eulogy, — monuments of marble and of brass, and of letters more enduring than all, — have in his own land and in ours, given the name and fate of *André* to the sorrowing remembrance of all time to come. American genius has celebrated his praises, has sung of his virtues and exalted to heroic heights his prayer, manly but personal to himself, for choice in the manner of death, — and his challenge to all men to witness the courage with which he met his fate. But where, save on the cold page of history, stands the record for Hale? Where is the hymn that speaks to immortality, and tells of the added brightness and enhanced glory, when his equal soul joined its noble host? And where sleeps the Americanism of Americans, that their hearts are not stirred to solemn rapture at thought of the sublime love of country, which buoyed him not alone 'above fear of death,' but far beyond all thought of himself, of his fate and his fame, or of anything less than his country, — and which shaped his dying breath into the sacred sentence which trembled at the last upon his quivering lip?"

T. H. Bartlett.

[To be continued.]

ANCIENT AND MODERN LIGHT-HOUSES.[1] — XIX.

SKELETON IRON LIGHT-HOUSES, CONTINUED.

In 1873 the old brick tower at Southwest Pass, Mississippi River, built in 1831, was replaced by a skeleton iron structure. The old tower was in a dilapidated condition, had sunk several feet into the soft ground, was three or four from the perpendicular, and its light was of an inferior order compared with its importance. At this place, the great difficulty was to obtain a secure foundation on the soft and treacherous alluvial formation of the Delta of the Mississippi. The plan adopted was as follows:

The foundation is octagonal in shape and fifty-eight feet eight inches lesser diameter. It consists first of one hundred and eighty-five square piles driven four feet apart to a depth of thirty-three feet. At six feet below the tops of the piles, which are one foot below low water, a horizontal course of twelve-inch square timbers are notched into them. Below the timbers a mass of shell concrete two

[1] Continued from No. 635, page 88.

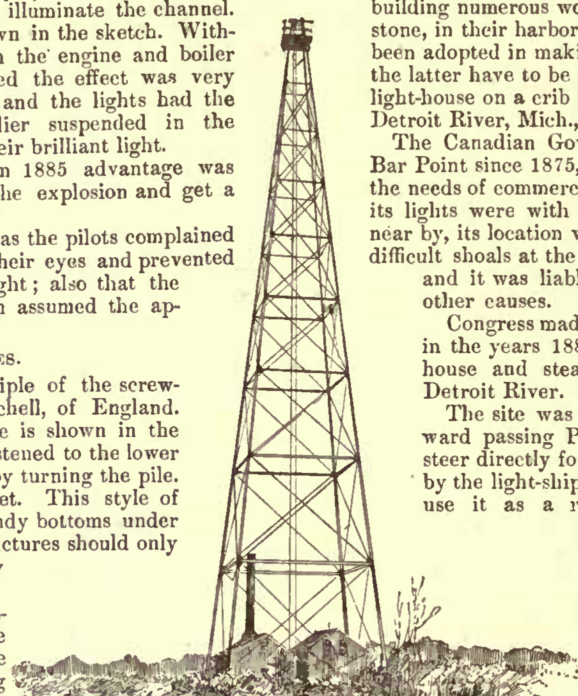
feet thick is rammed about the piles, and on the timbers rests a floor of three-inch plank. Above this floor are a second and third course of timbers notched into the piles and laid at right angles to each other and diagonally to the first course. A mass of concrete is forced into the interstices of the timbers and filled up to a height of

four feet above the third tier, bringing the top of the foundation eighteen inches above the main level of the water. The superstructure is a skeleton iron tower composed of six series of eight cast-iron columns placed at the angles of an octagon and strongly braced and tied by wrought-iron rods. On the sixth series stand the watch-room and lantern, access to which is gained by a stairway winding round the axis of the tower and inclosed in a wrought-iron cylinder. The keeper's dwelling, two-stories high, rests on the first series of columns.

The tallest skeleton tower in the Light-House Service was erected at Hell Gate, Astoria, N. Y., in 1883–84. It is two hundred and fifty feet high and was intended to display nine electric lights of six thousand candle-power each to illuminate the channel. Its construction is sufficiently well shown in the sketch. Within the legs of the structure are seen the engine and boiler house. When the lamps were lighted the effect was very beautiful. The tower was invisible and the lights had the appearance of an immense chandelier suspended in the heavens and flooding the scene with their brilliant light.

At the explosion at Flood Rock in 1885 advantage was taken of this tower to photograph the explosion and get a plunging view on the rock.

In 1886 this light was discontinued, as the pilots complained that it was so brilliant that it dazzled their eyes and prevented them from seeing objects beyond the light; also that the shadows were so heavy that they often assumed the appearance of obstacles.



SCREW-PILE LIGHT-HOUSES.

As previously mentioned, the principle of the screw-pile was invented by Alexander Mitchell, of England. The way the foundation screw is made is shown in the accompanying sketch. The screw is fastened to the lower end of an iron pile and forced down by turning the pile. It is sometimes assisted by a water-jet. This style of foundation is especially adapted to sandy bottoms under water, but in my opinion iron-pile structures should only be used in southern waters where they would not be exposed to floating ice.

There are a number of such structures in Chesapeake Bay, and the method of building has been the same in each case, the only difference being in the number of piles used, the bracing and the style of superstructures. In several cases these light-houses have been threatened with destruction by the ice, and it has been necessary to protect them with a ring of rip-rap placed at such a distance from the light-house that it would act as an ice-breaker.

The accompanying sketches show several of these structures. The general plan of all is a one-story dwelling with lantern in the centre. Most of them are also provided with fog-bells rung by clock-work. The projecting piles, shown in some, partially serve the purpose of ice-breakers. A time-honored joke of the light-keepers is that they have fine fishing privileges and that they raise all their own vegetables.

The "Bug Light" in Boston Harbor, officially known as "The Narrows Light," built in 1856, is another example of this style. Fortunately for its stability the shoal on which it was erected has so changed since the light was established that it is now seldom covered with water and the piles have been spared the shock of floating ice.

On the east side of the dredged channel in Mobile Bay, Ala., an hexagonal screw-pile structure was built during the years 1884–85. The bottom is soft mud, and on September 12, 1885, when the light-house was nearly completed, it commenced to settle, and went down bodily seven and a half feet. The subsidence was so nearly equal

on each column that the inclination of the structure cannot be detected by the eye. The actual difference in level between the extremes at the top of the foundation series is between three and four inches. No part of the structure was strained in the least. In order to prevent further subsidence, twelve creosoted piles were driven into the mud alongside of the structure and bolted to it. They were then cut off at about the water level. Since then the light-house has sunk no further.

LIGHT-HOUSES ON THE GREAT LAKES.

On our "unsalted seas," the great lakes, light-houses are as necessary as on our sea-coasts; on their shores timber of excellent quality is plentiful and cheap, and when submerged is practically indestructible as it is not exposed to the greedy tooth of the ship-worm which so soon destroys any wooden structures, especially in our southern waters and in the Pacific.

Advantage has been taken of this by army engineers in building numerous wooden piers, composed of cribs filled with stone, in their harbor improvements; and similar plans have been adopted in making the foundations for light-houses when the latter have to be placed in the water; an excellent type of light-house on a crib foundation is the one built in the mouth of Detroit River, Mich., during the years 1884–85.

The Canadian Government had maintained a light-ship on Bar Point since 1875, but though useful, it was not adequate to the needs of commerce. It could be seen only a short distance, its lights were with difficulty distinguished from vessel lights near by, its location was of little service as a guide between the difficult shoals at the entrance to the river inside its position, and it was liable to be driven from its station by ice or other causes.

Congress made appropriations to the amount of $68,000 in the years 1882–83 and 1885 for establishing a light-house and steam fog-signal at or near the mouth of Detroit River.

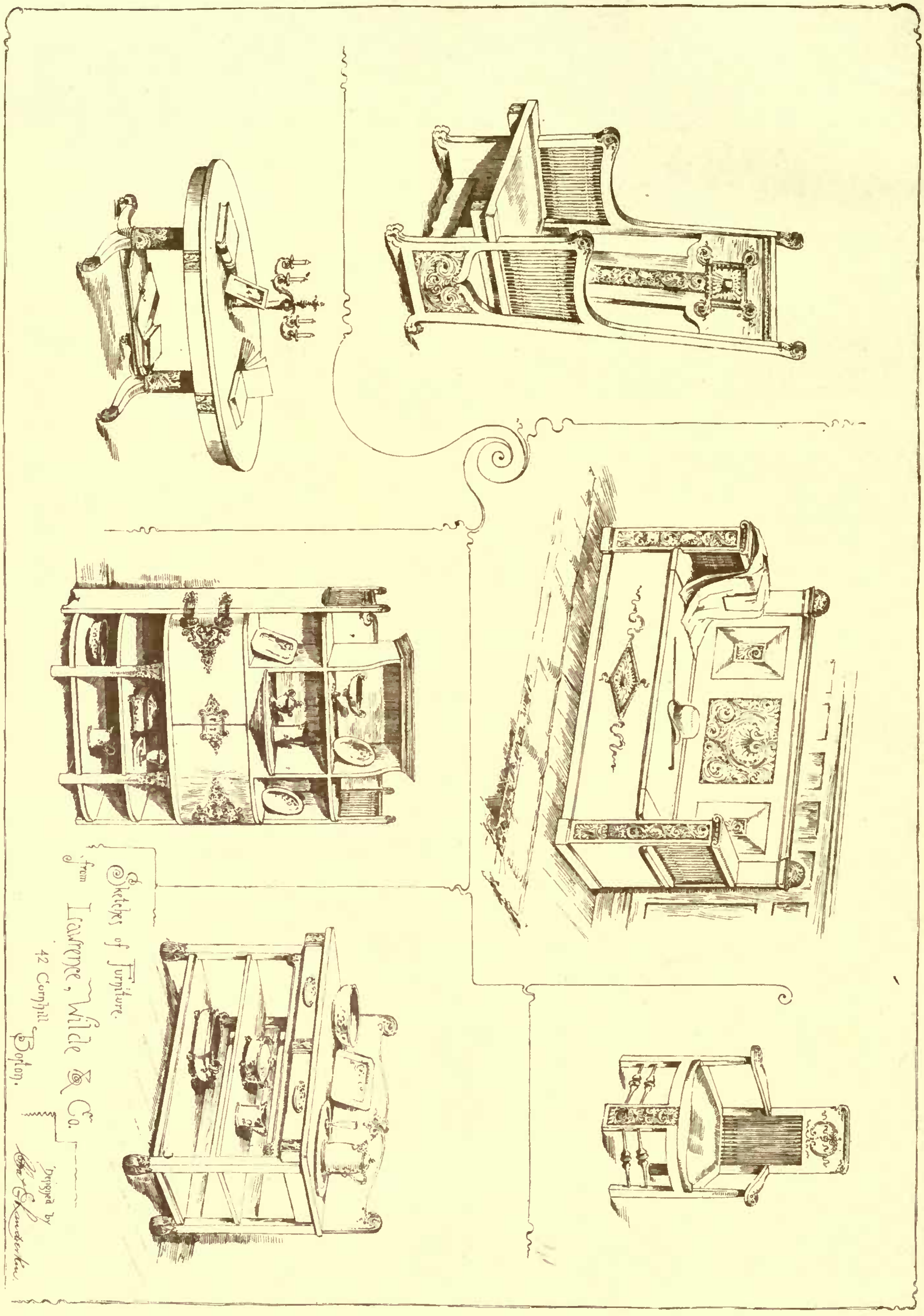
The site was so selected that vessels from the Eastward passing Point Pelée and sighting the light, could steer directly for it and clear the dangerous shoal marked by the light-ship; that vessels from the south-west could use it as a range with the Bois Blanc (Canadian) light to clear the long spit off Point Mouillée, while there would be no dangers in front for vessels approaching from any intermediate point; and finally, that this same range with Bois Blanc light would also lead through the narrow buoyed channel in the mouth of the river.

Soundings at the site showed that the bottom was generally quite level with a uniform depth of 22 feet. Borings gave approximately uniform results, the first three or four feet being composed of hard limestone, gravel and sand, very compact and difficult to penetrate, then twelve feet of soft clay and fine sand, easily penetrated, and finally underlying the whole a bed of tough, hard blue clay, very difficult to bore. No boulders were encountered.

The general plan of the foundation is a crib of heavy timbers with a tight bottom, this crib is 90 feet long, 45 feet wide and 18 feet high, thus bringing its top to four feet below high water; it is filled with concrete flush to its top.

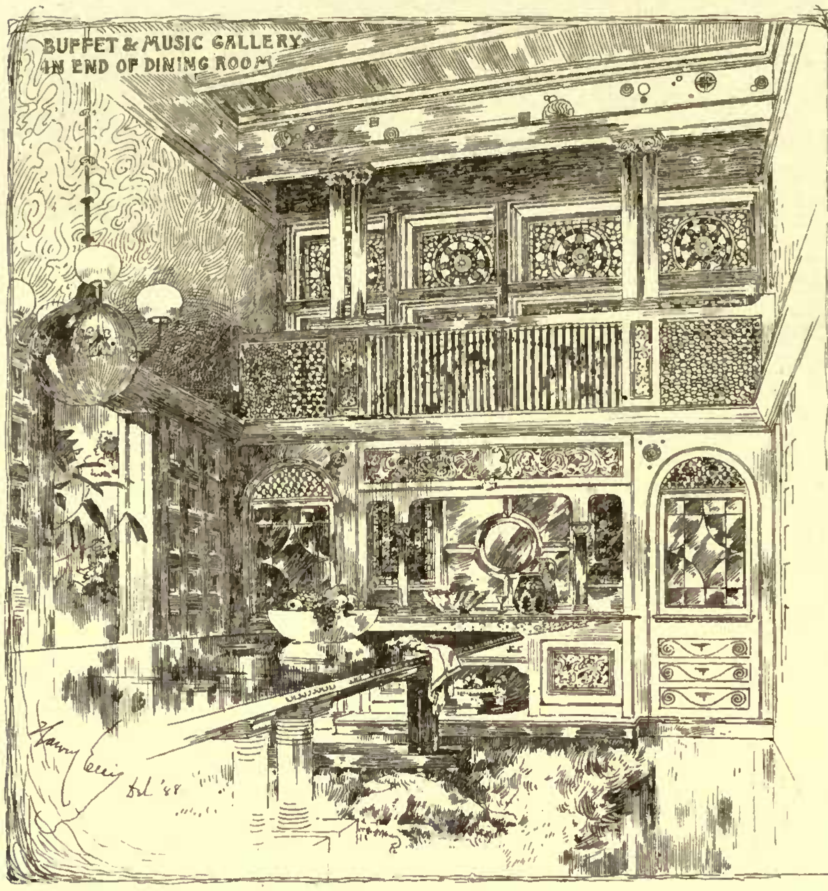
This crib supports a pier 15 feet high of cut-stone masonry backed

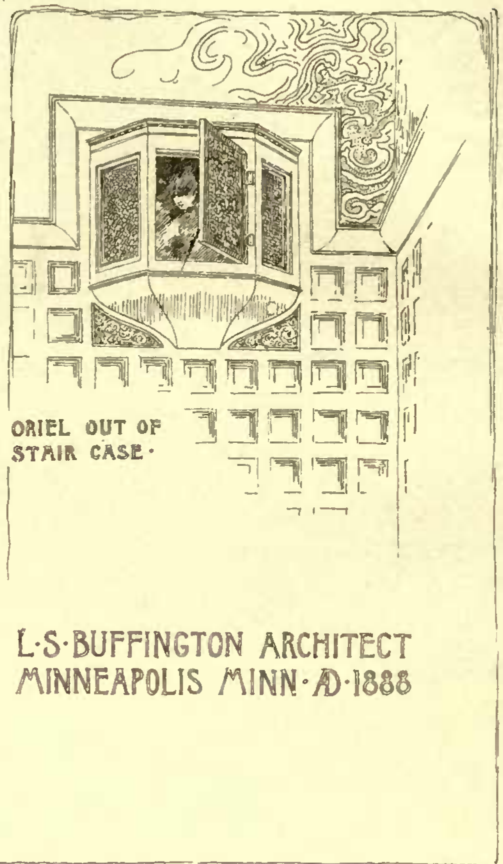
COPYRIGHT 1888 BY TICKNOR & CO

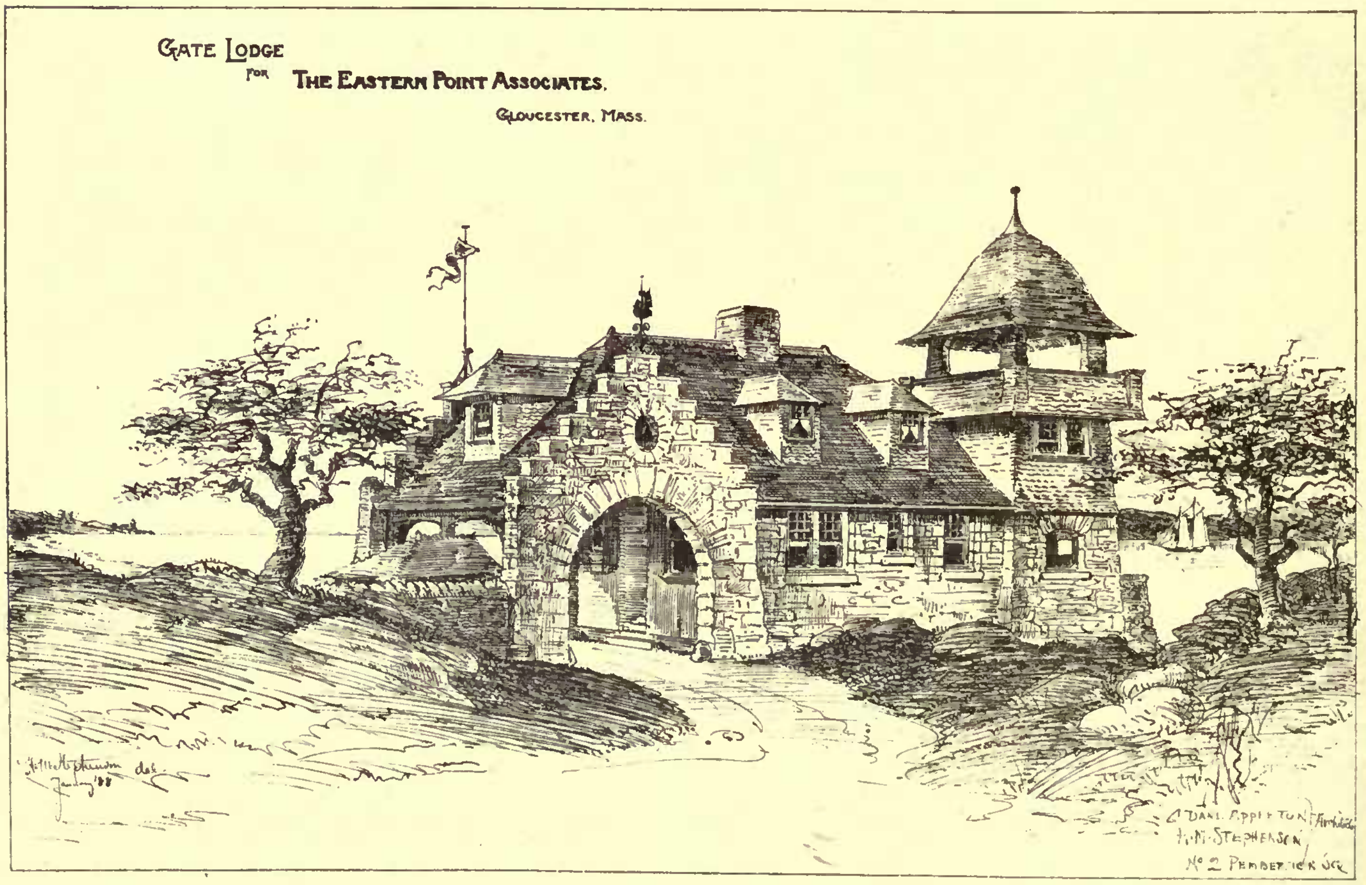


Heliotype Printing Co. Boston.

COPYRIGHT 1888 BY TICKNOR & Co

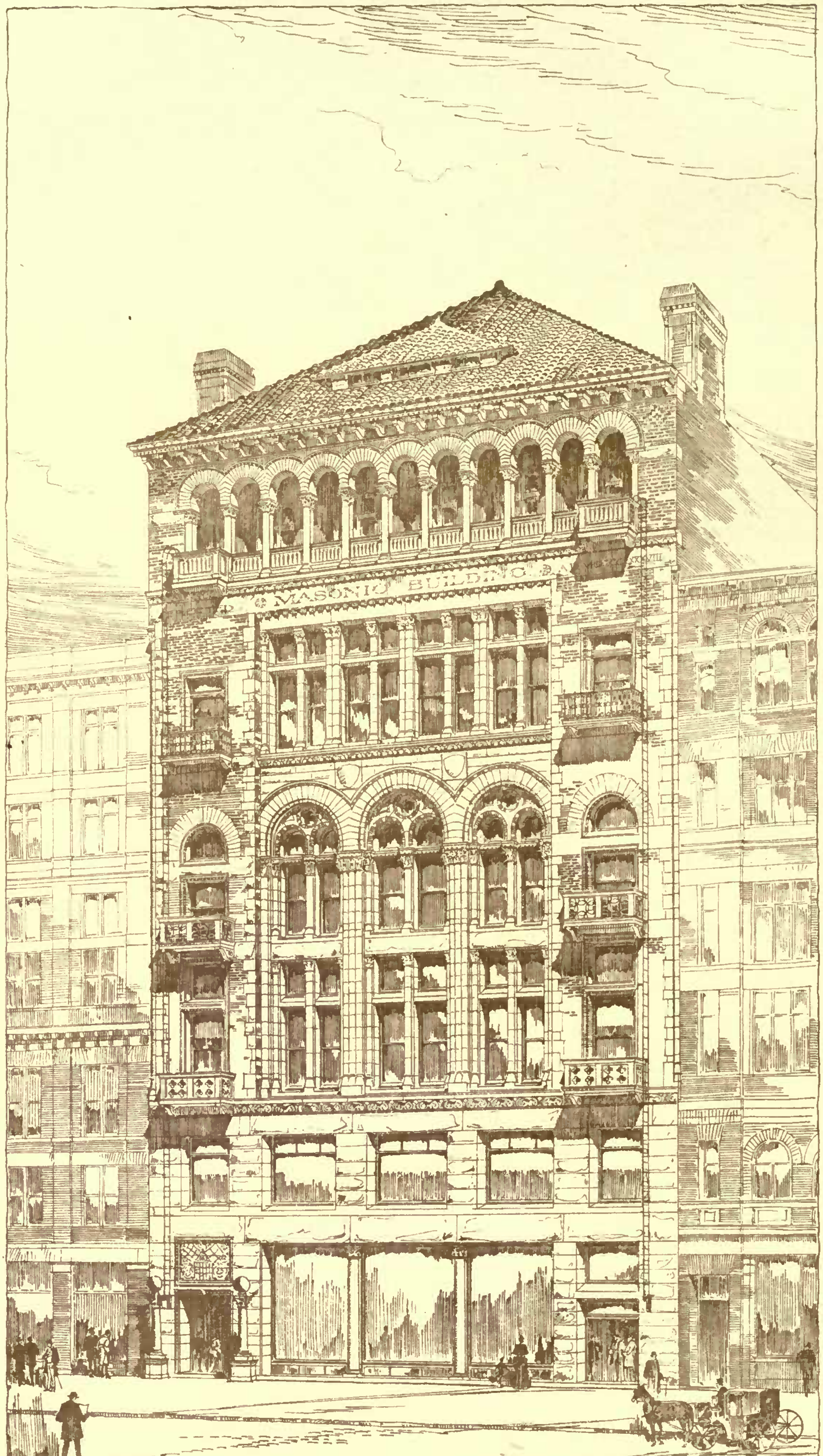






Heliotype Printing Co. Boston

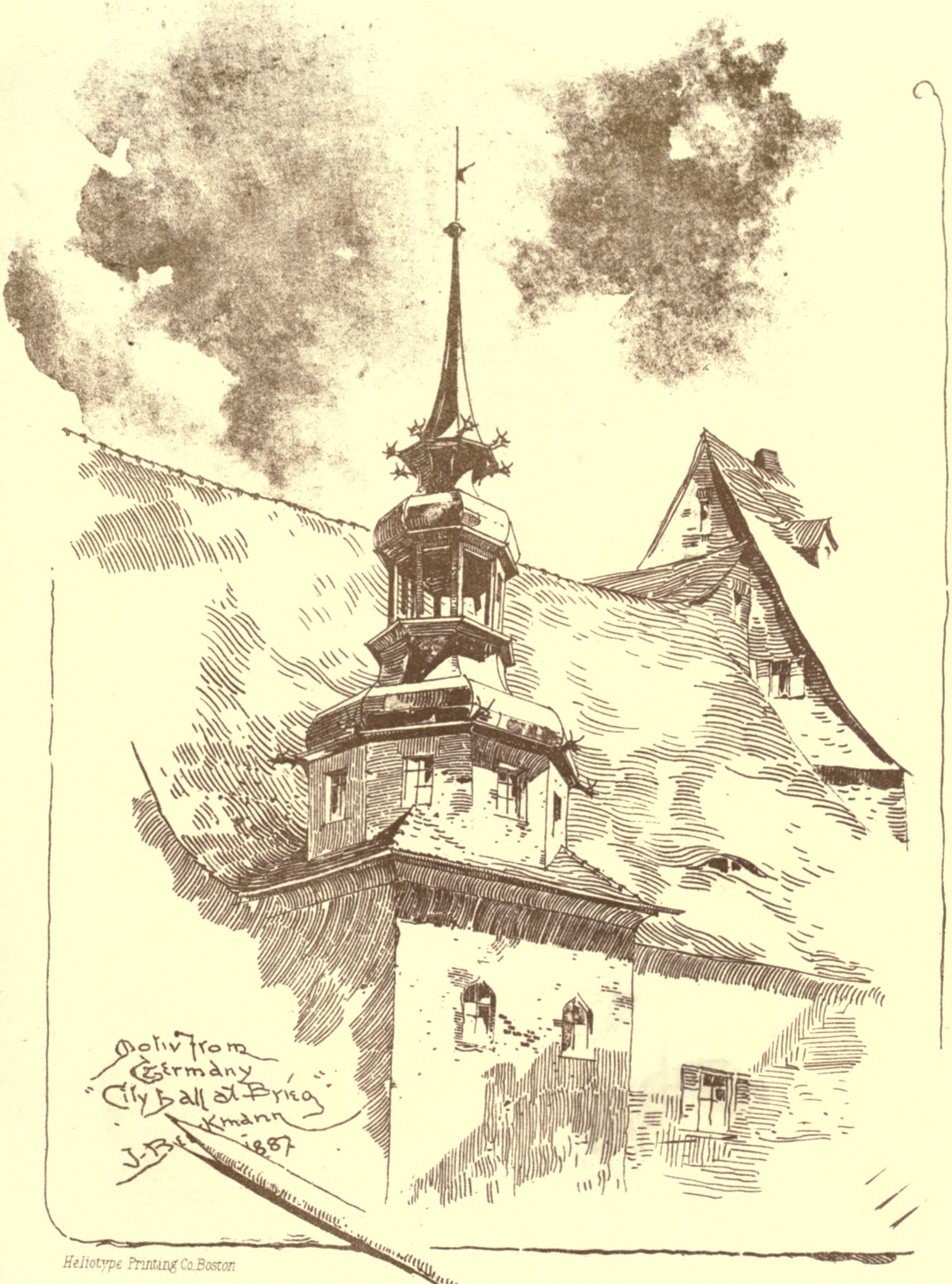
COPYRIGHT 1888 BY TICKNOR & Co



MASONIC BUILDING · PITTSBURGH, PA
SHEPLEY RUTAN & COOLIDGE ARCHTS. BOSTON.

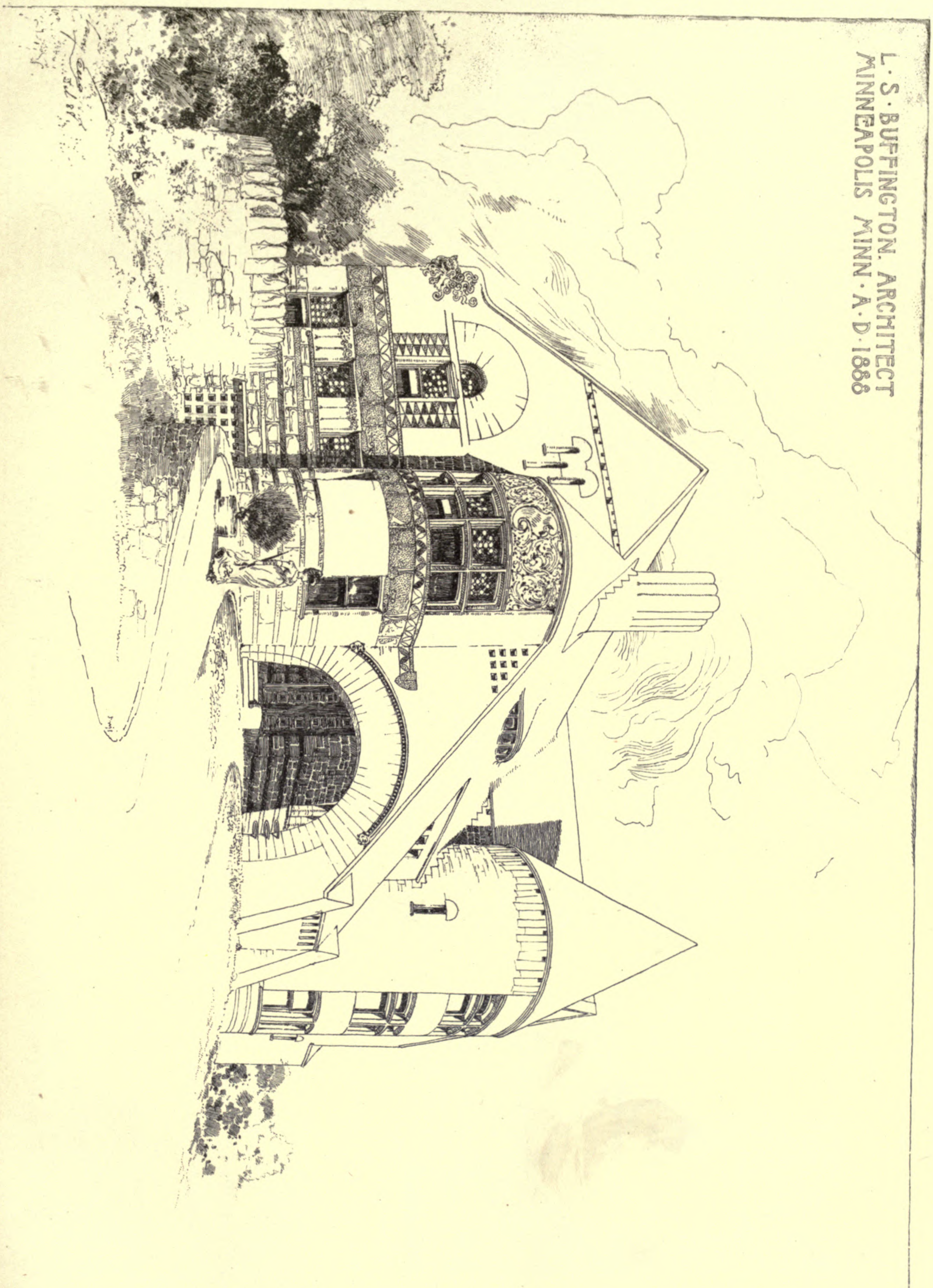
Heliotype Printing Co. Boston.

COPYRIGHT 1888 BY TICKNOR & Co



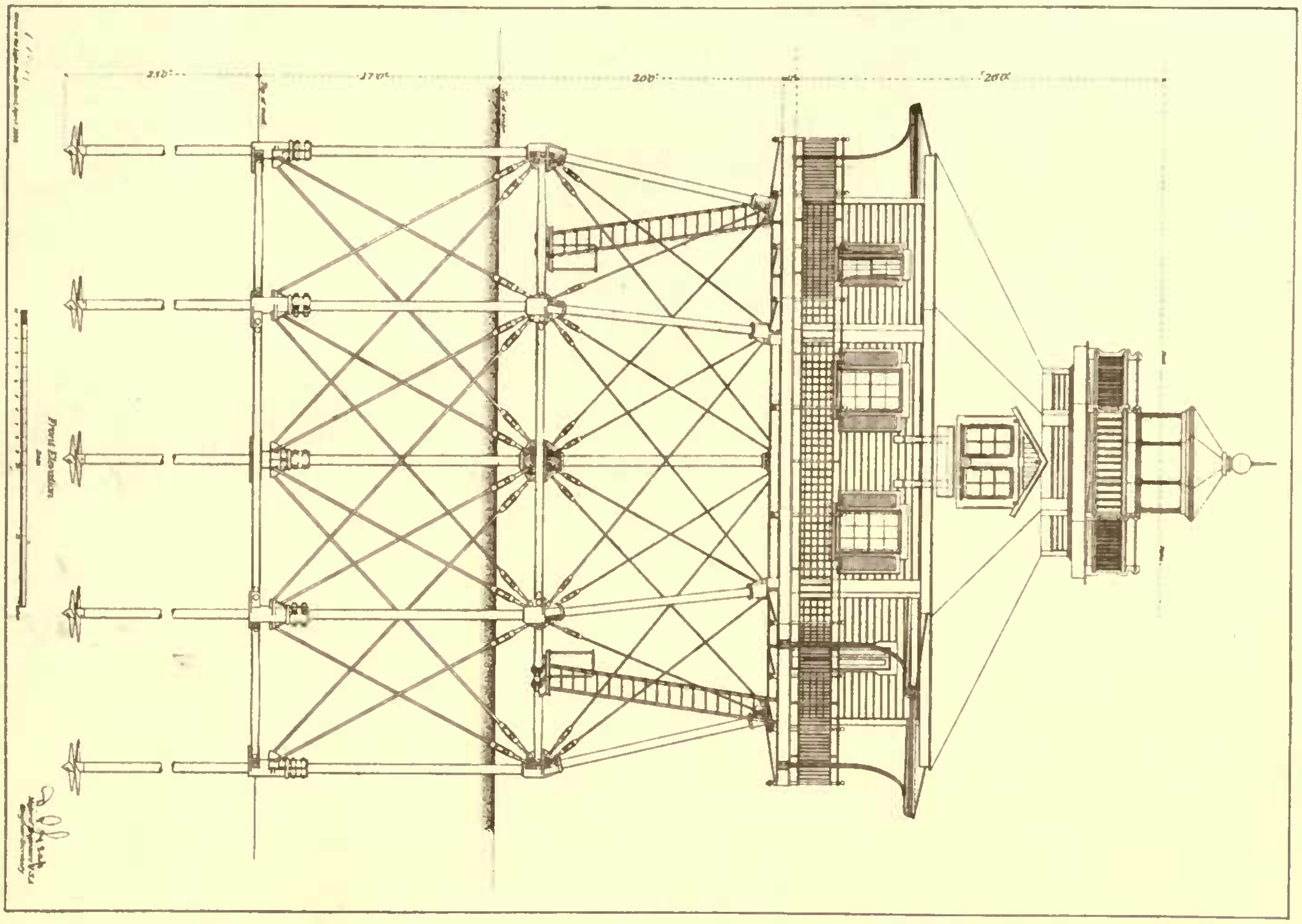
Heliotype Printing Co. Boston

COPYRIGHT 1888 BY TICKNOR & Co.

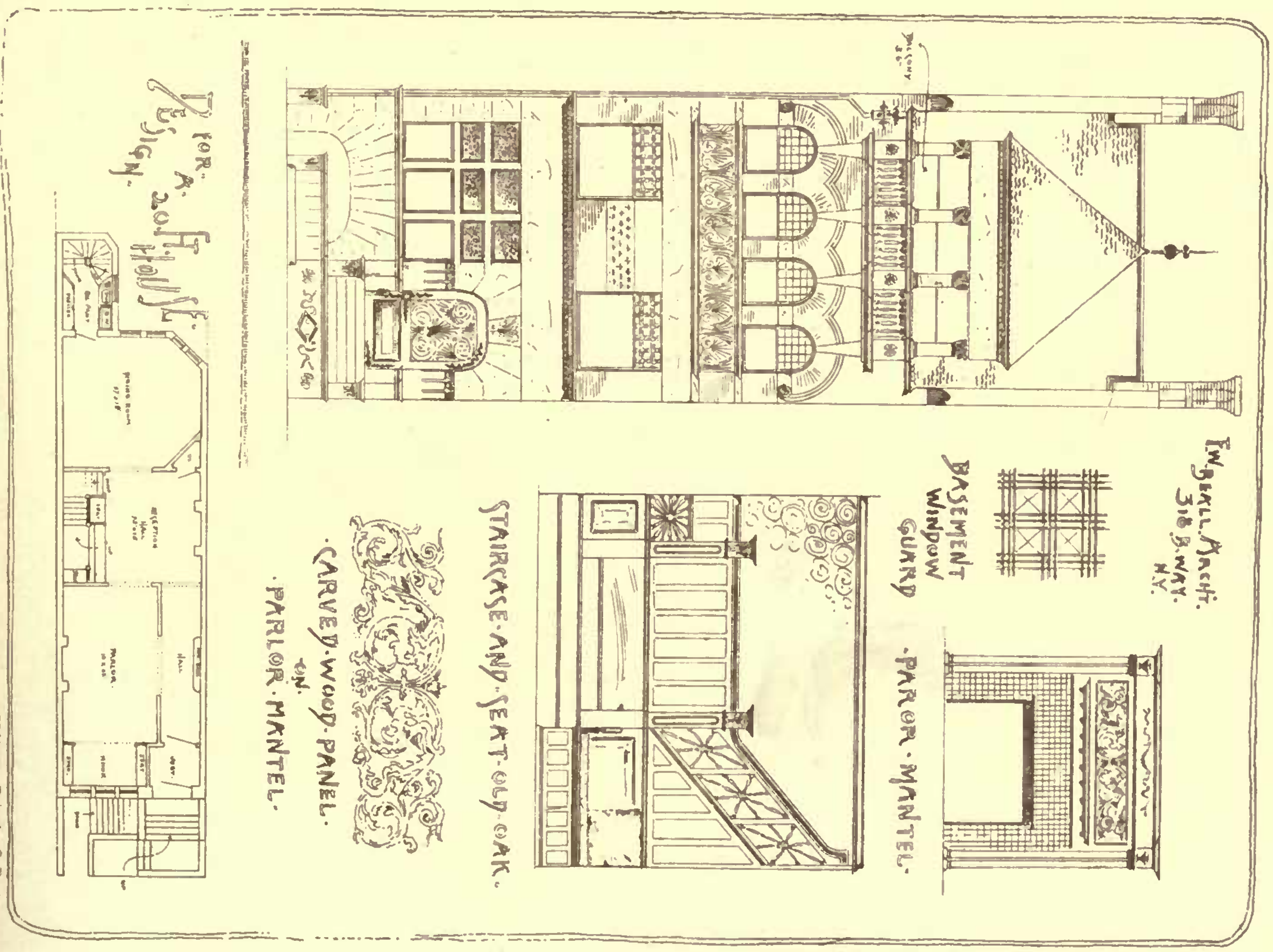


Heliotype Printing Co. Boston.

COPYRIGHT 1888 BY TICKNOR & CO



MOBILE BAY LIGHT HOUSE, ALA.

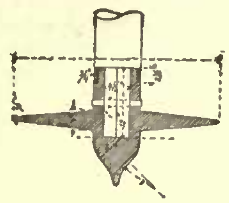


Heliotype Printing Co. Boston.

with concrete, the foot of the pier is nine inches back from the edge of the crib.

On the southern end of the pier is a cast-iron conical tower surmounted by a fourth-order lantern; in this tower, the keepers live.

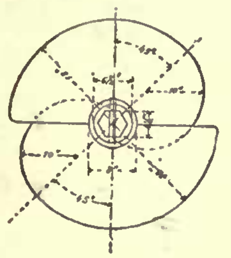
The fog-signal house, containing duplicate steam fog-signal apparatus, is built of heavy framed timber covered on the exterior with two inch planking and with inch boards on the inside, the space between is filled with mortar made of lime and sawdust. The roof and sides are covered with No. 18 corrugated iron, and the interior with No. 26 plain sheet-iron.



Section.
Foundation Screw.

The coal cellar is underneath the fog-signal house.

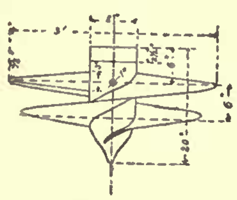
Amherstburg, Ontario, was the most convenient point at which to build the crib, and permission was obtained from the Governor-General of Canada to construct the crib there and to introduce the necessary tools, materials, etc., free of duty.



Plan.

Framing the crib commenced on March 19, 1884, on July 1 it was completed and partly filled with concrete while floating at the wharf, on July 3, it was sunk in place, by September it was filled with concrete, on November 21 the last course of cut stone was in place and backed with concrete; work was then suspended for the season, a temporary shelter was built and two men were left to display warning lights until the close of navigation.

During the filling of the pier the settlement was uneven, and at the close of the working season it had reached nearly 16 inches.



Elevation.

It was therefore decided to load the pier and leave it loaded during the winter with a much greater weight than it would ultimately have to stand. For this purpose 550 tons of rubble stone were distributed over the pier with a preponderance on the high side. The calculated weight to be borne ultimately was but 160 tons.

The settlement continued slowly for a while and then ceased; when the men in charge of the lights left it was 18 inches, the pier was level and since then there has been no change.

Work was resumed in May, 1885, the pier was paved, the various structures erected and the station entirely completed and lighted by August 20, of the same year.

This light-house was built under the immediate direction of Captain C. E. L. B. Davis, Corps of Engineers, from plans prepared by him.

On the completion of this light-house the Canadian light-ship at Bar Point was removed from her station.

[To be continued.]

The ILLUSTRATIONS

[*Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.*]

HOUSES ON COMMONWEALTH AVENUE, BOSTON, MASS. MR. CHARLES B. ATWOOD, ARCHITECT, NEW YORK, N. Y.

[Gelatine print, issued only with the Imperial Edition.]

MASONIC BUILDING, PITTSBURGH, PA. MESSRS. SHEPLEY, RUTAN & COOLIDGE, ARCHITECTS, BOSTON, MASS.

This design was accepted by the Freemasons in a recent competition.

LIGHT-HOUSE IN MOBILE BAY, ALA.

For description see article on "Ancient and Modern Light-houses" elsewhere in this issue.

GATE-LODGE FOR THE EASTERN POINT ASSOCIATES, GLOUCESTER, MASS. MESSRS. APPLETON & STEPHENSON, ARCHITECTS, BOSTON, MASS.

HOUSE FOR F. B. HART, ESQ., MINNEAPOLIS, MINN. MR. L. S. BUFFINGTON, ARCHITECT, MINNEAPOLIS, MINN.

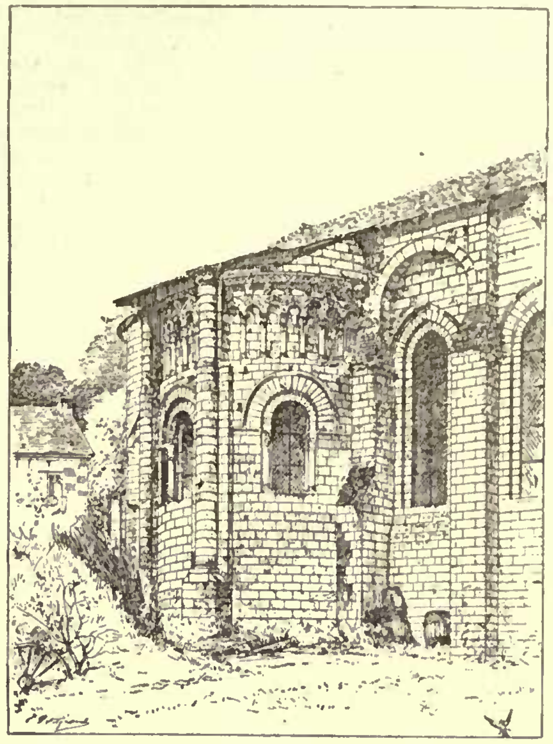
MUSIC-GALLERY AND BUFFET IN THE SAME HOUSE.

DESIGN FOR A TWENTY-FOOT HOUSE. MR. F. W. BEALL, ARCHITECT, NEW YORK, N. Y.

FURNITURE DESIGNED BY MR. CHARLES E. LANDERKIN, BOSTON, MASS.

BELFRY OF THE HOTEL DE VILLE, BRIEG, PRUSSIA.

THE ART OF HOUSE-BUILDING. — I.



Circular Chapel-Cunault-France
From L'ART.

M. J. BOUSSARD, architect and officer of Public Instruction, has just published under this title[1] at the Librairie des Imprimeries réunies, at Paris, a book which, in spite of its special title, has a general interest. It treats of questions which not only concern those who wish to build or repair houses, but questions of health, public and domestic economy, morality, enjoyment, security, and everything which concerns the habitation, and ought to attract the attention of the public authorities, the statesmen and the legislators in countries where private initiative is powerless to undertake new reforms without the support of the State. One may say, when the importance of this question is recognized, that the civil power of a nation always gives the exact measure of the degree of civilization at which it has arrived, and that a people has only such dwellings as it deserves through the knowledge it has acquired of the conditions which conduce to healthy, convenient and agreeable habitations.

The author maintains here a thesis which may be discussed and which ought to be, but he supports it with some brilliancy. His conception is that the ideal building is typified in the Gallic house as it existed in the second century, and to justify his retrospective enthusiasm he dedicates his book to Brennus, conqueror of Rome. But when he speaks of the Gallic house, M. Boussard can only understand, and does really understand, the Roman house, for the architecture which flourished in France at the epoch I have just mentioned could only be, and in fact was, a fruit of Roman importation after the conquest of Cæsar. In the train of the conquerors, Roman civilization passed into Gaul, and there manifested itself under every form. Already in the reign of Augustus there was held at Narbonne a congress to determine the impost and the manner of providing in the conquered provinces such establishments as favored progress, public prosperity and civilization. In less than two hundred years Gaul was covered with flourishing cities and splendid architectural monuments, of which only rare relics, alas, have escaped the fury of successive invaders. Road-making had reached a very remarkable degree of perfection; artistic bronzes, terra-cottas, marbles, paintings, frescos, mosaics, all the accessories of decoration, were scattered with lavish hand. The smallest articles of household use which have been discovered prove that the artistic taste extended to the most ordinary needs of life. But at the beginning of the fifth century the invasions of the barbarians destroyed this world that had been created beyond the Alps through Roman initiative. Pillage, murder, and the blind rage for destruction allowed almost nothing to remain. The implacable and raging invaders pushed everything before them, massacred the populace and razed the cities in such fashion that on the morrow of disaster were seen rising on the ruins of the desecrated palaces the huts of the Visigoths, the Saxons or the Germans. A new architecture was substituted for the old. A century afterwards the chiefs of the victorious tribes began to build châteaux, about which were grouped, for purposes of defence, the huts of the soldiers, already became serfs or slaves. The new society, already on the road to dismemberment, practised all the vices of the society it had deposed—slavery, love of war and rapine—without possessing any of the better qualities of Roman civilization. Then began a

[1] "*L' Art de batir sa Maison*" Librairie des Imprimeries réunies, Paris.

long period of barbarism, in the course of which disappeared every tradition of intelligent architecture. The dead were interred in churches, near to which were built hospitals for the sick. The arts of heating and cleanliness were ignored. The exteriors of buildings were embellished to satisfy the vanity of feudal chiefs, but the interiors lacked comfort and healthful arrangements. Fourteen centuries were necessary for the descendants of the ancient Gauls to perceive this retrogression, and still more were needed; the teaching of Viollet-le-Duc, who in part aimed at the rehabilitation of the architectural doctrines of antiquity, and he was not very popular in France.

At the present time the method of technical instruction is far from perfect. The French Government sends young artists to Rome and to Athens; but these artists ordinarily undertake to study the monumental side of the ancient buildings, to draw out and reconstruct their outward appearance. One never sees them endeavoring to determine what was the interior arrangement of the dwelling-house in these two great cities, which were the most puissant sources of light to the ancient world.

The modern house in France is only a carricature of a house, and the author draws an unflattering sketch of it. "What profound ignorance," he cries, "of the arts of building, and heating, and ventilating and decorating. Wall-paper, imitation marble, bad painting,—these you style decoration; foul chutes for water-closets, humidity in every room, pure air nowhere,—this is your hygiene; unhealthful stoves, fireplaces that smoke and do not heat and are a permanent peril, furnaces which poison you,—these are your means of heating. Finally, a fair façade in stone is plastered over this void, and before this the constructer parades his ignorance." "It is time," he continues, "to rebel against this system, and declare war on typhus, diphtheria, small-pox, cholera and consumption, which are the consequences of the defective arrangements of our cities and of our dwellings, and which, in truth, were unknown to the Romans and the Gauls."

To justify his admiration for the life of the ancients, M. Boussard describes in the first part of his book the arrangement of a Gallic house. In the first place, heating was managed from the outside by means of the hypocaust. The space under the lower floor was unoccupied; piers placed a short distance apart supported the floor above; at the opposite ends were two openings which communicated with fireplaces placed in the court-yard. Flames and heat passed along the underside of the hypocaust and engendered an agreeable and equal heat. There was no smoke, no deoxygenation of the air, none of the phenomena which to-day render accidents so common. The smoke escaped by vertical flues wrought in the thickness of the walls, which flues were carried in the walls round about the rooms for the sake of increasing the temperature within.

For the want of space I cannot here dilate on the details of this system, but the author, who has experimented with it in two villas built by him, assures the reader that he obtained excellent results, and that the consumption of combustibles is relatively small. He perceives also the following advantage: With the present existing methods the heating apparatus does not come under the oversight of the architect. With the re-introduction of the Gallo-Roman method the architect once more becomes absolute master of everything relating to the construction of the house of which he is the creator.

The public baths were also heated by the aid of the hypocaust. Bathers first entered a gallery where they found attendants and paid the price of admission. Then they were directed towards the first room, to which came only waves of warm air, which served to prepare them for the transition as well from the outside within as from within out. This room contained, probably, gymnastic apparatus for the stimulation of the perspiratory glands. In the next hall the temperature was higher. Here the bather undressed, and the slaves carried off his clothes and hung them in a neighboring chamber. Next the bather passed into another room where the temperature varied between 25° and 30° Centigrade, greatly encouraging perspiration. In order to avoid congestions the slaves served the bather with a foot-bath, and stretched him on a marble couch. The time spent in this chamber amounted to a half-hour. Next he passed into a still hotter room, where the air was heated up to 40°, and if this temperature was not high enough to provoke perspiration, the bather was made to sit down in a marble arm-chair placed in the centre of two hemicycles heated up to 50° or 60°. He then passed back to the preceding room, where he was subjected to massage, after having been enveloped in a lather of soap, and, this finished, next plunged into a bath of cold water, or received a cold or tepid douche, according to taste, or the special treatment he was following. This description is drawn from the ruins of the Gallic baths at Verdes (Loir et Cher), and agrees sufficiently with all the notions which we have concerning the thermal baths of the Romans, who must have been the importers of the hydropathic tastes of the Gauls.

There have also been found and studied ruins of other interesting baths at Gennes (Sarthe), at Drevant, at Perrenou, at Jublains, at Cimiez, near Nice in the Maritime Alps; but one of the most complete systems of hypocaust found in France is that at Rhodez, the chief town in the Department of Aveyron. Nevertheless, I would, so far as the applicability of this system to modern construction, cite only with much reserve the opinion of the author. In a general way we are wrong to believe that the habits of the ancients, as we know them, can be applied to the society of our days, whose customs, methods and resources are so different from those of the vanished peoples. One too easily believes that the Roman habitation, whose internal arrangements have been reproduced on paper after close study of the remaining ruins, represent the common type of dwelling. These habitations were really palaces, and palaces can only belong to very wealthy families. The edifices which have not entirely disappeared in the cataclysms which have overwhelmed the races of the Greek and Roman world, can only be those which from their solidity, the excellence of their construction, and by the amplitude of their arrangement possessed the necessary conditions to survive in some degree the grand catastrophes of history; but these edifices do not give us an exact idea of the average comfort at the service of the society of those days. They generally belonged to patricians, and because we discover in them numerous traces of luxury and refined decoration, it is not proper to conclude that luxury was at that time within the grasp of everybody, and that the rules of hygiene and convenience, evidenced by these ruins, were generally followed. This error, which one cannot too often correct, has greatly contributed to give birth to the equally erroneous supposition that the ancients understood the science of hygiene better than we do. Surely if we compare the house of a modern workman with the plan of a villa of the time of Lucullus, for example, the advantage rests with the Romans; but it is certain that the public health was not then, as it is to-day, a subject of general preoccupation, and that on this head an average doctor knows to-day more than a senator of the time of Augustus, although there is a great deal in the way of progress for us yet to realize. The Roman dwelling, for example, had very low doors and few windows: air and sunlight, which are the most powerful health-giving agents, penetrated the building under difficulties. The interior division of the house was in no ways hygienic, and the construction of the privy vaults of the dwellings of the poor was very bad. The women and children were relegated often even in the most patrician palaces to the remotest parts of the dwelling. The gymnasia alone prove that our ancestors knew some of the essential conditions of health; but they practised hydropathy and delivered themselves up to bodily exercise through habit and taste, affectation and idleness, rather than under the influence of reason, while to-day the renaissance of gymnastics and the practice of hydropathy are the fruits of scientific deduction. Even in this we are their superiors, although there is much for us to do before the use of the douche and the passion for the trapeze are so generally a part of our daily life as the similar exercises were of the daily life of the Romans. We may admire these children of Romulus without seeking to imitate them in everything. As for the selection of sites for their towns, for instance, the Romans were less advanced than the Etruscans, who were their superiors also in the arts, in morals and in laws. The Etruscans always built their cities upon heights, so that they were dry, airy and protected from noxious miasms. The Roman cities, on the contrary, were built without precaution from the point of view of aëration, and the site selected for the foundation of Rome is a convincing proof of this. We must be on our guard against this Roman spirit in those things whose manifestations are not in harmony with modern needs. Europe dallies on the way toward progress precisely because Roman tradition still attaches it to the things of the past. America has marched with giant strides towards civilization just because she has known how to create her own customs and her institutions at a single stroke, and her real grandeur dates from the day when she banished slavery, which she inherited from the Spaniards, who in their turn received it from the Romans.

To return to heating, I consider that the hypocaust system has unquestioned advantages, and can be used in habitations of a single story occupied by small families. It could be scarcely adapted to large buildings of several stories, such as we see in modern cities, where the furnace in the cellar succeeds in satisfying all the conditions of a common and uniform source of heat. I question whether a hypocaust with vertical flues and the fire out-of-doors could distribute the desired quantity of heat in a house of six stories, for instance, unless the floor of the lower story was constantly at a white heat, in which case, in order to secure a decent degree of warmth for those in the upper story, it would be necessary to broil those who dwell on the ground-floor.

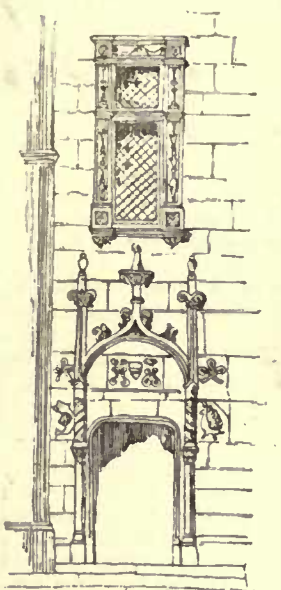
M. Boussard devotes several chapters of his book to the study of the materials employed in the Gallo-Roman buildings — the pavements, decoration and stucco and mosaic — and these chapters are not the least interesting in his book. I am sorry not to be able to give an abstract of them here, but this would lead me too far. We understand, moreover, that in whatever concerns solidity, ornamentation, veneering, the architects of that time were of great ability, as is testified by certain ruins.

It is time that we examined the Roman house in its entirety, in order to understand the way in which life was led within it. The Roman villas almost never had more than one story. With rare exceptions all the rooms were arranged about a central court. The floor was raised about sixty centimetres above the level of the ground. The framework supporting the roof was very elegant and light. The roof was formed of tiles absolutely identical to those half-round tiles which we use to-day, or the flat tiles fitted one to another by the aid of rivets. Glass was commonly used for the windows, for the garrets and the court-yard, and probably for the interior courts. The Romans understood glass-making, and if we have found only rare specimens it is because, as M. Boussard very wisely observes, glass oxidizes in contact with

moisture. The best morsels are those which have been found in enclosed spaces, that is to say, in tombs. They consist of phials and lachrymatories. It is certain that the Romans did not invent the process of glass-making. The Greeks already made it, according to Winckelmann, and used it for construction and certain domestic purposes. The Etruscans also had knowledge of this industry, and from them probably, rather than from the Greeks, the Romans learned it: certain Etruscan museums contain objects of much interest from this point of view. In that at Orvieto, I have seen, for instance, a small glass phial, black threaded with white, which proves not only that the Etruscans made glass, but that they worked it with much ability and refinement, for the phial at Orvieto presents many points of resemblance with the product now turned out of the celebrated glass-works of Murano at Venice, from which we can conclude once more that "there is nothing new under the sun." The blue glasses of Pompeii, set off by enamel on a white background representing vine branches and figurines, prove that for eighteen centuries this industry has rather retrograded than advanced; for the Pompeiian relics are far more artistic than the best modern products of the workshops at Ravenna. We know, also, that glass-mirrors were in common use at Rome — so common that persons of distinction preferred them to plaques of polished metal. H. MEREU.

[To be continued.]

SPONTANEOUS COMBUSTION.



Chateau du Rocher à Mézanger France.

IN November of last year a force of men was sent aboard of the "*City of Newcastle*" to extinguish a fire in a cargo of cotton which had been generated by spontaneous combustion. An unsuccessful attempt to extinguish the fire had been made at Queenstown, the first port at which the vessel stopped.

Baled cotton and also cotton and fibres and rags that are saturated with oil are quite subject to spontaneous combustion. In five years forty-six ships bound for Liverpool alone and loaded with cotton were burned either at sea or just before or after their departure. This figure is much too low, judging from the remarks of a rich English banker who is familiar with affairs in all parts of the world. Of the long list of vessels laden with cotton or grain, nine had just been burned in whole or part, and he added that it was necessary that steps should be taken to prevent the fermentation of cotton, which appeared to be more combustible at that period than usual.

The remarkable tendency which is observable in tissues and cotton when moistened with oil to become heated when oxidation sets in, deserves particular attention, and especially so from the sad results that may follow negligence, caused too often by ignorance of the danger or ignorance of the necessary precautions. In the navy, for instance, every precaution is taken to avoid spontaneous combustion. Thus, all the officers are aware that before packing away the tarpaulins or oiled coats which the sailors wear in bad weather, it is necessary to see that they are thoroughly dried. They should not be packed together in too great numbers. Oils, when drying, undergo a change which is simply a slow combustion at low temperature. If this action is hastened by any cause whatever, it brings about a higher temperature, which may result in fire.

The experiment may be made by producing spontaneous combustion, even in a few yards of cotton cloth, by painting it with linseed oil. M. Chevalier cites an instance of this nature in the sail-room at the arsenal at Brest, where three cases (for sails) of canvas painted with oil had been laid one on the other, after having been dried in the sun two days. Each piece measured about ten yards. Whether in the sun or shade, or under cover or exposed to the air, these pieces of fabric, whether yarn or cotton, can readily take fire, but fortunately very soon attract attention from the dense smoke that is emitted. Cotton fabrics containing oil, however, do not alone take fire in closed chambers and in the holds of ships, for I have seen the phenomenon produced in open air. I witnessed a case in point near the railroad station of l'Ouest, in July, 1878, when the heat was very great. The lamp-room is situated at the foot of the Rue de Rome and the Pont de l'Europe. There, in a large sack, were gathered all the useless, greasy rags that had been used for cleaning the lamps. One of these bags had been filled so full that the rags had fallen to the ground, and as I passed by I noticed an odor of burning rags, but after a careful examination, discovered no cause for this. Passing the same place five minutes later, I found the odor stronger, and I discovered the rags were just bursting into flame. I called an attendant and showed him the fire, and it was very soon extinguished with the help of a pail of water.

M. Chevalier, in his memoir on fires, instances the experiments of Messrs. Golding & Humphries, who caused spontaneous combustion by shutting up a piece of fabric immersed in linseed oil in a closed box, where it was left for three hours. The fabric commenced to smoke and as soon as the air was admitted burst into flame.

Messrs. Renouard and Rouen carried still farther the experiments of Golding. They mingled a few pieces of oiled cotton cloth with some dry cotton, and then put the whole under pressure, and after a few hours fire was discovered. Every one is aware that when cotton is baled, it is subjected to an enormous pressure. If the cotton is greasy or even damp, it ferments, becomes heated and then ignited.

A curious instance was reported by Dumas to the Institute in 1844 and cited by M. Fonssagrives. An artist was rubbing with a wad of cotton a painting freshly varnished. When he threw the cotton away, it immediately took fire in mid-air. Later, at the Academy of Sciences in 1879, during a discussion concerning a fire in the floor of a laboratory of a certain botanist, M. Cosson, M. Dumas cited a number of cases which prove that the condensation of the air in porous and combustible bodies frequently produces combustion if the temperature is sufficiently low. Among these he again cited the case of the wad of cotton taking fire in mid-air. A savant as prominent as Dumas, who repeats the same statement at an interval of thirty years, classes it evidently as an indisputable fact. The temperature of 80° or 100° in the hold of a vessel does not sufficiently explain the cause of a fire in a cargo of damp linen, hemp, manure, oats, grain or cereals. It is necessary to take into consideration the changed conditions. The rise in the temperature is due to the condensation of gas and to the rapid and powerful oxidation. Thus charcoal, which is very porous, when shut in a closed atmosphere, absorbs a large proportion of gas, which condenses and produces heat.

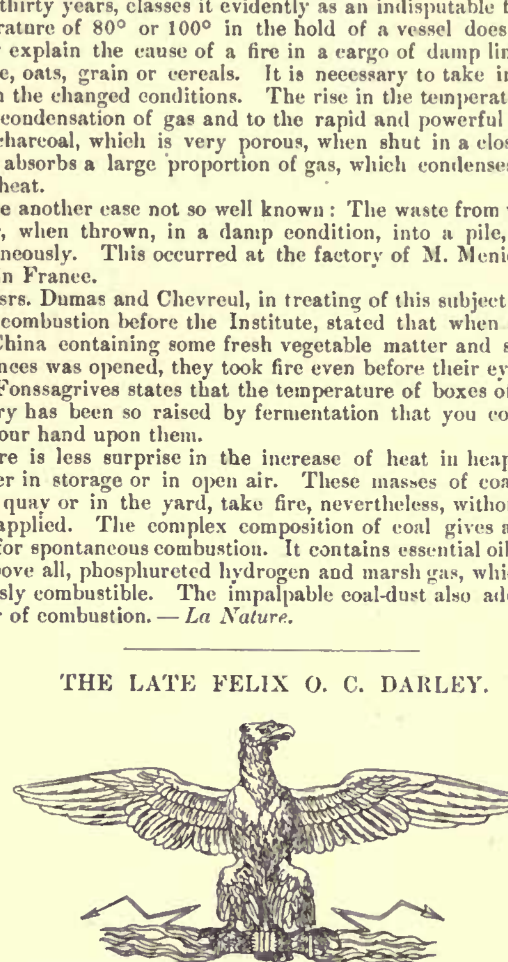
I cite another case not so well known: The waste from vulcanized rubber, when thrown, in a damp condition, into a pile, takes fire spontaneously. This occurred at the factory of M. Menier, at Grenelle, in France.

Messrs. Dumas and Chevreul, in treating of this subject of spontaneous combustion before the Institute, stated that when a package from China containing some fresh vegetable matter and some dried substances was opened, they took fire even before their eyes.

M. Fonssagrives states that the temperature of boxes of figs from Barbary has been so raised by fermentation that you could hardly bear your hand upon them.

There is less surprise in the increase of heat in heaps of coal, whether in storage or in open air. These masses of coal, whether in the quay or in the yard, take fire, nevertheless, without a spark being applied. The complex composition of coal gives a sufficient cause for spontaneous combustion. It contains essential oils, sulphur, and above all, phosphureted hydrogen and marsh gas, which is spontaneously combustible. The impalpable coal-dust also adds another danger of combustion. — *La Nature.*

THE LATE FELIX O. C. DARLEY.



Eagle des. for Napoleon I
by C. Normand — after Raguenet.

FELIX O. C. DARLEY, says the Philadelphia *Telegraph*, who died at Claymont, Del., yesterday, was born in Philadelphia, June 23, 1822. His taste for art and an inclination to make it his profession, were shown in his boyhood. At fourteen he was placed in a mercantile house in the hopes that his thoughts might be diverted into another channel. But the kindling fire of genius happily was not thus to be extinguished. Viewing with positive distaste the routine of the counting-room, he spent his spare moments in drawing, in which he made rapid improvement. The subjects that first interested him were figures of firemen, and other types of city life. In these he displayed so much originality and artistic power, that he was offered a handsome sum for them, and advised to rely wholly upon his pencil for support. The dream of his young life seemed about to be realized. With joy he gave up his mercantile occupation, and devoted himself to art. During several years various large publishing houses at Philadelphia gave him constant employment in making designs. His work showed continual improvement, and received praise from critical judges. These delineations had the merit of vigor, humor and great faithfulness to life and character. A series which was published about this period had much popularity in the Southern and Western states.

In 1848 he removed to New York City. Here he found employment in illustrating Irving's "*Sketch Book*," his "*Knickerbocker's*

History of New York," and other publications. The inimitable descriptive and humorous powers of Irving were never more vividly presented than in the illustrations by the now practised pencil of Darley. He also made a series of designs in outline from Judd's novel of "*Margaret*," without any definite intention of publishing them. They were seen, however, by the Committee of the American Art Union, in New York, at that date a flourishing and influential institution for the advancement of art, who at once gave him a commission to illustrate Irving's "*Rip Van Winkle*," for distribution among the subscribers. He made six drawings, which were much admired. During the following year he completed another series, illustrating Irving's "*Legend of Sleepy Hollow*." These drawings were largely circulated, both in the United States and England, and placed their author in the front rank of American designers. It was admitted that no modern productions, in either country, were superior to them in any particular. In 1856 his illustrations of "*Margaret*" were published in New York, in a folio edition, and were very successful.

Subsequently he turned his attention to the preparation of vignettes for bank-notes, and much of this beautiful work was executed by him. Still later he undertook the illustration of the works of Cooper in thirty-two volumes. This book embraced no less than five hundred sketches, and he devoted to it the full grasp of his artistic mind and skill, with marked success. He has thus forever linked his genius and name with that of the greatest American writers. A large copy in crayon, representing the death of Scipio, was in the exhibition of the American Academy in 1858. His drawing of the "Massacre of Wyoming," and others, relating to American Revolutionary history, are spirited and beautiful pictures, some of which are seen in almost every house in the land. He contributed various designs for Irving's "*Life of Washington*." An illustration from Longfellow's poem of "*The Courtship of Miles Standish*" was published in New York in 1858–59 in photographic form.

In 1859 he married a daughter of the late Warren Colburn, the eminent mathematician, and removed from New York to Claymont, Del. Besides his work on the volumes of Cooper, he illustrated the works of Dickens. His illustrations of the text of the latter in humor and expressiveness will compare favorably with any of the illustrations made by the most celebrated English designers. He made a series of four drawings for Prince Napoleon, at his request when in this country, which received the unqualified praise of that person.

In 1865 Mr. Darley made a large composition of "Sheridan Checking the Retreat near Winchester," for Mr. Hatch, of New York, also two pictures in oil for the same gentleman, one of which, "Going to the War," was engraved in line by Rice, and published. About the same time he produced another large design, entitled "On the March to the Sea," which was engraved by Ritchie, and published by L. Stebbins, of Hartford. During the War he made for Mr. Williams S. Blodgett, a wealthy manufacturer of New York, two large compositions, "Dahlgren's Charge at Fredericksburg" and "Foraging in Virginia," both of which were published in photograph. All of these pictures relating to the War have become famous. In historical accuracy of scene and person, in graphic delineation, and in artistic study and delicacy, they are well worthy of the partial judgment which educated criticism as well as popular favor has awarded to them.

Mr. Darley visited Europe for the first time in the summer of 1866. This afforded him a long-desired opportunity for making sketches of various people and places abroad. During a term of thirteen months he travelled extensively, and used his pencil with his accustomed skill. On his return, his letters and sketches were published in a volume, under the title of "*Sketches Abroad with Pen and Pencil*." While in Rome he made a number of studies in water-colors of the models, and produced two or three compositions in the same medium for private collections. Within the last ten years he made a large number of less important drawings than those enumerated. The leading publishers looked to him, to a great extent, for the higher style of designs for standard works.

Mr. Darley passed a life of diligent application to his profession rather than taking any exciting part in the world's affairs. "I have neither met with accident nor adventure of any kind," he once wrote, "mine has been neither a strange nor eventful history. My summers have been generally given up to the sports of the field — shooting and fishing — for which I have a weakness." He was a thorough lover of Nature, and a worshipper of the beautiful in all its forms. His skill in art was in a very limited degree mechanical, but it was inspiration coming from a keen sense of the teachings of Nature, and the suggestions of individual character and habits.

The productions of Mr. Darley have been submitted to the most cultivated criticism of his own country and of Europe. His peculiarities have been found to be advanced ideas in artistic taste, and his powerful and original conceptions have shown a remarkable blending of the truth of Nature with the advancement of imagination. His pictures are images of the natural, and at the same time, new creations of fancy. The scene and the persons are so exact that they are the reproduction of life itself, but they are equally expressive of the brain and hand which have delineated them. In a word, Darley was not only a great artist, but he was so strikingly original that he is neither an imitator, nor can he be imitated.

His outline drawings to Judd's "*Margaret*" gave him a reputation nearly as great as that of Moritz Retzsch. In 1879 he appeared with a work that won at once the highest admiration. This was his series of twelve "Compositions in Outline from Hawthorne's Scarlet Letter," in which a wonderful realism and weird ideality are combined with much power. Many will remember his illustrations of the life of an American farmer, in his drawings of the seasons for "*Appleton's Almanac*." Mr. Darley was of a noble and lovable character, full of earnest aspiration and faithful endeavor to accomplish his best work, but with remarkably little of mere personal ambition.

MONUMENTAL USE OF BRONZE IN JAPAN.

WHILE in the service of the Government of Japan some years ago, says Mr. R. Henry Brunton, in the *Journal of the Society of Arts*, I was kindly furnished, by one of its oldest officials, with what he assured me was reliable information regarding old Japanese bronze images. These are remarkable alike for their enormous proportions, the method of their construction, and the excellent character of the alloy composing them.

A very wonderful specimen known as "Daibuts" is situated about seven miles from Yokohama, and being within treaty limits, is visited by every visitor to Japan. But the largest and most remarkable bronze image in Japan is placed at Nara, some miles eastward of Kioto, or Sai Kio, as it is now named, and this has been seen by but few foreigners. An image on this site was first erected in the year 743, but it and a subsequent one were destroyed during internal wars. The present image was erected about the year 1100.

Its dimensions are as follows: —

Height of figure (sitting posture)	53.5 feet.
Length of face	16.0 "
Width of face	9.5 "
Length of eye	3.9 "
Length of ears	8.5 "
Width of shoulders	28.7 "
Length of palm of hand	5.6 "
" middle finger	5.0 "

On the head there are 966 curls. The image is surrounded by a glory, or halo, seventy-eight feet in diameter, on which sixteen images, eight feet long, are cast. Two smaller images, each twenty-five feet high, stand in front of the larger one.

The total weight of metal in the main figure is about 450 tons, and this is said to consist of the following: —

	Pounds avoirdupois
Gold	500
Tin	16,827
Mercury	1,954
Copper	986,080
	1,005,361

In considering the reliability of the above figures, it may be borne in mind that they were furnished to me by a Government official from Government records, but that, apart from the respectability of their source, I have no confirmation of them.

The large images are not cast in large pieces, but are built up with a multiplicity of small pieces of irregular shape, which are cemented together by a compound known to the natives as *handaru*, the composition of which I have not been able to discover. As illustrating the excellence of this cement, I have closely examined this large image, and could not discover any softening or signs of decay at the joints. Further, the cement has taken on the same tarnish as the bronze, and the joints are therefore not observable except on close inspection.

The images are in the form of Buddhist deities, and from whatever point of view they may be regarded, whether artistic or merely mechanical, they are interesting examples of isolated and early skill.

PROGRAMME FOR THE EXAMINATION OF CANDIDATES FOR THE ROTCH TRAVELLING-SCHOLARSHIP.

Boston, Mass., April 7, 1888.

PROBLEM IN DESIGN — A CASINO FOR BATHS.

THIS establishment situated upon the new Charles River Embankment should provide ample accommodations for plain and medicinal baths, and offer to a luxurious public such comforts and recreations as may make it a fashionable resort. To this end there should be joined to the bathing department a well furnished gymnasium with tennis-court and bowling-alley, a large reading-hall, billiard-room and a café in which light refreshments may be served. Directly upon the river must be a boat-house, and one or two pavilions for use in hot weather and for watching races. Porticos connecting these outlying buildings can be glazed in winter to give sheltered and sunny walks. The grounds should be rendered as attractive as possible.

The department of baths should provide for a large swimming-bath, twenty-five bath-rooms, twelve douches, separate accommodations for the Russian and Turkish service, dressing-rooms, lockers, water-closets, etc.

There must also be an apartment for the family of the medical-director, as well as consultation-rooms for his use. There must be lodging for twelve employés.

The buildings will be heated and electricity generated by a powerful engine. A strong light must be thrown upon the water to permit rowing and boating parties after dark.

The depth of lot is five hundred feet; its river-front is not limited

The preliminary sketches must clearly indicate the scheme proposed, by a plan and elevation to a $\frac{1}{32}$ scale.

The finished drawings, required to be brought to the Museum of Fine Arts on April 23 at 5 P. M., are:

One plan on a $\frac{1}{16}$ scale.

An elevation towards the river with cast-shadows on a $\frac{1}{16}$ scale.

A perspective on an imperial sheet.

A section on a $\frac{1}{16}$ scale.

This set of drawings must be accompanied by a thesis, explaining the architectural character of the design.

Too great a change in the finished drawings will throw a design out of competition.

Examinations will be held at the Museum.

The different subjects will be marked on the following basis:

French	15
History	15
Free-hand drawing	15
Construction	30
Design, including thesis	100

COMMUNICATIONS

BOOKS.

SPRINGFIELD, ILL., April 2, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — We noticed in an editorial of the *American Architect* of March 24th, two architectural works spoken of, one being Mr. Wightwick's "*Hints to Young Architects*" and the other being Mr. J. T. Micklethwaite's "*Modern Parish Churches.*" Can you inform us where they can be bought and state to us the cost price of each if you have any means of obtaining such information. In so doing you will greatly oblige us.

Very truly yours, BULLARD & BULLARD.

[THERE are several different editions, American and English, of the "*Hints to Young Architects,*" varying in price from a dollar and a half to three and a half. Micklethwaite's "*Modern Parish Churches*" must probably be ordered from England, and will cost here about three dollars. Sabin & Sons, Nassau Street, New York, or Estes & Lauriat, Boston, will procure them at as low rates as possible. — EDS. AMERICAN ARCHITECT.]

WHO PAYS THE CONSULTING-ARCHITECT?

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — Will you please advise me as to the accepted practice in regard to the compensation of *consulting architects.* Are they usually paid a percentage separately and in addition to the list charges made by the regularly-employed architect, and if so what is the rate? Or must their compensation be a division of these list charges with the regular architect? My feeling is that the regularly-employed architect earns his full compensation irrespective of the advice and assistance afforded by the *consulting* architect, but I wish to have an equable and just basis upon which to arrange for this class of work in the absence of any special agreement covering the case. An early reply will greatly oblige,

Yours respectfully, P.

[WE cannot say what the general practice is in such cases and doubt if there is any rule. If the owner chooses to go to a consulting architect to get a comparison of opinions on a difficult point or to assure himself that the one he has already employed is doing his work well, we see no reason why the latter should pay any part of the expense. Consulting physicians and associate counsel are always employed at an extra charge, and an architect's relation to his client may be fairly regarded as being just about midway between that of physician and counsel. If, however, the architect himself wishes to supplement his knowledge, in responsible undertakings which fall strictly within his province, by ascertaining the experience of others, he will, under many circumstances, prefer to do so at his own expense. — EDS. AMERICAN ARCHITECT.]

NOTES AND CLIPPINGS

A NEW WATER-SUPPLY FOR PARIS. — It is well known that Paris is not well provided with regard to drinking water, having to draw its chief supply from the upper course of the Seine and the Canal de l'Ourcqe, branching off from the Marne. A Swiss engineer, Herr Ritter, has submitted to the Paris municipality a plan by which the city may be furnished with an ample supply of water from an inexhaustible source — the lake of Neufchâtel, Switzerland — at a cost of 300,000,000 francs, or £12,000,000. This heavy outlay would, however, be covered after construction by a safe revenue for interest and amortization. Herr Ritter is an engineer who has established his reputation for the construction of water-works, and the success attending the works he erected at La Chaux-de-fonds has encouraged him to make the proposal in question to the Paris municipality. Some time ago another engineer, M. Beau de Rochas, proposed to furnish Paris with water from the Lake of Geneva, at a cost of 500,000,000 francs, but the scheme was not accepted, probably on account of the great expense. Herr Ritter is more moderate in his estimate, and there is a probability of its being accepted. The principal details of the great undertaking are given as follows: The distance between the lake of Neufchâtel and Paris is 312 miles, and the surface of the lake is 1,620 feet higher than the mean level of Paris, its total area covering 350 square kilometres. This vast body of water, even if it were not replenished, would be sufficient to supply Paris for two years at a rate of 132 gallons per head per day, the level of the lake falling no more than three feet, and the water, which would flow with a speed of rather under 100 feet per second, would arrive at Paris at a temperature of 50° Fahr. But a lowering of the level of the lake is not to be thought of, for the lake has tributaries yielding a larger supply of water in the hot season than in winter. Herr Ritter does not intend to take the water from the surface of the lake, but to draw it off, as is done in the case of Chicago from Lake Michigan, by an underground heading 262 feet below the surface of the lake, where it has a temperature of only 43°. The water would be taken through a tunnel twenty-two miles long under the Jura Mountains to the Dessoubre Valley, in the Department of the Doubs, and thence in an arched conduit along the slopes of the hills to Paris, where it would arrive still at an elevation of 394 feet. As the present reservoirs of Paris have an elevation of only 295 feet, raising the fall, or pressure, by 100 feet, with a flow of 4,400 gallons per second, would give a tremendous motive power. Herr Ritter has calculated that in this manner Paris could be furnished not only with an illimitable supply of excellent drinking water, but also with the electric light in all the streets and water-power in all the workshops at a reasonable price, independently of the advantages accruing to the districts through which the conduit would be laid, and which could also draw their supplies from the same source. Herr Ritter estimates that it would take six years to complete the works along the whole line. — *London Morning Post.*

OUR SMALL ARMY OUR GREATEST BLESSING. — Sir Lyon Playfair in *Contemporary Review* for March says: At the present moment the United States has 250,000 inventions protected by the patent law. This activity of invention shows ability and intelligence among her people, who are always ready to turn to account the forces of nature for the benefit of man. This country in her workingmen is rich in producers, and if their intelligence were trained in connection with their work, she need not fear the industrial competition of any European nation. All great foreign nations, except the United States, are terribly handicapped in the industrial race by excessive armaments. England is also weighted, but not to an equal extent. The strength of nations consists in peace, but they make a sad error by not knowing that the weakness of nations is in active war, or excessive preparedness for it. France, Germany, Holland, Italy, Belgium and Great Britain have 2,200,000 men withdrawn from being productive citizens, in order to be protective militants, at a cost for each man of £45. If we take all the civilized nations, adding the reserves to the permanent forces, fourteen and a half millions of the strongest men are or may be withdrawn from production. This is one man for twenty-four of the population, or, if we exclude the reserves, one out of eighty-one. That is the reason why I point to the United States as the great industrial nation of the future, for her armed forces represent only one man in 1,610 of the population. Luckily, her protection policy is an incubus upon her industry, and gives us breathing time to prepare for the coming struggle.

A GIRL OF GRIT. — An old-fashioned Yankee of Quaker stock, who ran a small shoe-factory, indulged in a theory that nothing could pry out of his mind that a moral wrong was somehow perpetrated upon the community at large if a woman were allowed to earn above a stipulated sum each week. As his help was paid by the piece, and he had to keep tally in the main with current prices, he found this hard to manage at times. The swiftness of one young woman especially troubled him greatly. She would persist in running financially ahead of the others. At last he made a special cut-down in her prices, and told her why he did it. She gave him a baleful glance, tightened her lips and went on working. By Saturday night, despite the cut-down, she made ten cents above the week before. Another week went by, when he cut her down still more. The damsel still proved game and rose to the occasion. After a week or more the Quaker conscience grew "scared" and he asked her what she meant. "It means," said the girl, "that you may keep on and I'll keep on till you have a corpse on your hands in this workroom, for I'm grit and you can't conquer me!" The race ended there, and the girl was allowed normal pay. — *The Boston Record.*

A TOWN BOMBARDED BY ICE. — The following reaches us from Archangel: On a little peninsula which juts out into the bay of Kandalak is a fishing village called Kashkaransy. At 4 o'clock on the morning of January 5th, the fisher-folk were awakened by a strange, dull noise, which suddenly changed into a succession of loud, cracking sounds, like the firing of guns. The people sprang out of bed and rushed from their huts to see a wonderful and dreadful sight. The wind had risen and, on the northwest side of the peninsula, the sea was driving the ice against the land. Great masses of ice were tumbling about on the surface of the water, and then raised on the crests of the heavy waves, dashed with irresistible force and a roar like thunder, against the village. The breakwater, that had always hitherto effectually protected the shore from the fury of the sea, was like a toy against the miniature icebergs which were hurled over it against the village beyond, tearing the houses up from their foundations, and wrecking everything that lay in their way. The peasants managed to save their lives and those of their cattle by flight, but all their dwellings and property were completely destroyed. — *London Globe.*

HARBOR IMPROVEMENTS IN BUENOS AYRES. — A description is given in the *Annales des Ponts et Chaussées* for January of the plan of harbor improvements at Buenos Ayres so long delayed by political and financial difficulties. The Argentine Congress has approved Engineer Manero's plans and voted $10,000,000 for the construction of a new

port, the work on which is already commenced, and which will consist first of a canal 100m. (328 feet) wide and 6.4m. (21 feet) deep below low-water level, prolonging the Balisas River for the entrance of large ships; a basin of the same depth will be constructed for vessels remaining but a short time, and four other docks or basins also of the same depth, whose quays will have a total length of 8 kilometres (26000 feet); finally, a maritime basin of equal depth and 1,430m. (4,692 feet) long will be made. All the masonry will be of béton blocks. Separate storehouses will be built for imported and exported goods, which will occupy a total area of 1,000m. (3,280 feet) by 50m. (164 feet), and have a capacity of 315,000 cu. m. (10,963,900 cu. feet). All the quays will be provided with loading and unloading appliances, cranes and derricks.

The Explorations at Paphos.—What will be the first find in these new excavations at the ancient home of the Love-goddess? Will it be anything to rival or even approach that Praxitelean Venus of the Vatican which the present pope has just stripped of its envious tin draperies—worthy to have been inscribed with a legend recording them as presented not "*munificentiâ*," but "*pudicitiâ*," Pii Sexti, and which he has just presented to the admiring world of art in its surpassing and immortal beauty. Perhaps, to use a homely expression, there is "no such luck." Yet, it will be hard if some choice works of art are not brought up from beneath that silent silt of ages. A temple of such world-wide fame and sanctity, a shrine which probably dated from long before the "great period" of Greek art and which endured until long after that period had passed away, ought surely to have been rich in curious offerings; and such tributes, when they dated from a brilliant artistic era, must sometimes, at any rate, reflect the beauty which was the birthright of their time. If the Venus of Praxiteles could find its way to the temple of the goddess at Cnidus, and not only survive to extort the admiration of Lucian, who had been brought up to the sculptor's art, and "knew a thing or two" in statuary, but live on for another seventeen hundred years to be the wonder of our own generation in the eternal city—if these things are possible, we say, at Cnidus and at Melos, and at other sites of the goddess's temples, why not at the greatest of them all? For it must never be forgotten that at no other place in which shrines dedicated to Venus may have been found would bear comparison in point of religious dignity and solemnity with that which we are about to explore. Paphos was to the goddess what Lemnos was to her limping husband, an island specially and emphatically sacred to the respondent, if we may so describe her without offence, as the other was to the petitioner. The "innamorata" of Mars not only resorted to Paphos as a pleasant place of abode, but she retired to it in circumstances of difficulty, for it is thither, if we mistake not, that she withdrew in divine confusion on that unlucky day when Helios condescended to the part of a private detective and Olympus was agitated by one of the greatest scandals which ever shocked its not excessive moralities. Paphos was to Aphrodite what Delos was to Apollo, or Cyllene to Hermes, and to offer up homage to her at this her favorite shrine was a good work, far more likely to result in benefit to the doer of it than the rendering of worship to the goddess at any other spot in the world. The temple must have been singularly rich, and there has been no Verres to plunder it. Nothing, probably, but the wasting touch of time and the neglect and contempt of Turkish rulers for all religions and religious places but their own can have conspired to rob Paphos, or rather, Kuklia, of its art treasures, and these should certainly, therefore, have left some survivals behind.—*London Telegraph.*

Almost frozen in Bitumen.—A singular and at the same time serio-comic accident lately happened to a Paris watchman named Parnot. Parnot was employed near the Champ de Mars to look after some buildings which were in course of construction, and in order to keep himself warm during the night he put some planks over a cauldron of boiling bitumen, and, covering himself carefully up, went to sleep on them. During the night the planks gave way by degrees, and the man slid gently into the bitumen. Under normal conditions he ought to have been boiled, but the bitumen was just beginning to feel the effects of the frost, and so the watchman was saved from a horrible death. Unluckily, however, the bitumen before thoroughly freezing had adhered to Parnot's clothes and flesh, and about 4 o'clock in the morning he was awakened by cold which seemed to have entered the marrow of his bones. On endeavoring to get up, he found himself glued to a bed of adamant, and shouted energetically for help. His cries attracted some matutinal marauders who were prowling around the locality for plunder, and these worthies, instead of helping the unfortunate man out of his bituminous bed, eased him of his watch, a purse containing a small sum of money, and his knife, after which they indulged in unseasonable chaff as to his inability to "rise with the lark," and finally left him to his fate. Parnot was nearly frozen to death when the workmen arrived in the morning and extricated him from his perilous position. He had to be admitted to the hospital as an urgent case, for not only were his feet frozen, but he had seriously injured himself in his energetic but ineffectual endeavors to rise.—*Boston Herald.*

Statue of Liberty on the Washington Capitol.—Mr. Jefferson Davis writes to the New York *World* that Sculptor Crawford had nothing to do with the statue on the dome of the Capitol at Washington, and adds: The facts, as my memory serves, were briefly these: An order was accepted by Mr. Powers to make a statue for the dome of the Capitol. His cartoon represented a female figure with a "Liberty cap" on her head. I objected to the "Liberty cap" as the accepted emblem of the freed slave, at the same time stating that our people were born free and had maintained their freedom. Mr. Powers modified his design, substituting for the cap a crown of feathers, as indicative of our aborigines, by which he thought to render the figure typical of America, as the representative of which the statue was intended to stand. I do not remember what, if any, other modification was made. The only objection offered by me having been removed, the design was accepted and the work executed by the renowned statuary Powers.

The Third Artesian Well near Paris.—The artesian well which has been in course of construction at the Place Hébert, Paris, for the past twenty-two years has just been completed. The water-bed lies at a depth of 719m. 20c. from the surface of the soil. Paris now possesses three artesian wells; viz., at Grenelle, Passy and the Place Hébert.—*Exchange.*

TRADE SURVEYS

A general scaling down of railroad freight rates seems to be one of the probabilities of the early future. One of the remote causes which have made this a necessity, is the decentralizing influences that have been at work during the past five years in our industries. Statistics show that in Illinois, the manufactured products have increased 50 per cent within that time. In Iowa, 30 per cent, and in other Western States the increase has been from 15 to 40 per cent. Manufacturing establishments have been multiplying. The construction of railroads throughout the West and Northwest has drawn thither a vast amount of capital, enterprise and labor, and the resulting industrial developments have created new necessities with which railroad companies have to deal in the way of fixing rates. This necessity has been emphasized by the Interstate Commerce Law, and by the establishment of substantially new commercial and financial centres in the far West. Then, again, the growth of commercial organizations of one kind and another, such as Boards of Trade and labor associations, the development of competition from new sources of supply and the possibility of a further lessening of transportation rates by inland water-routes and increased lake-craft, all converge into the necessity for a rearrangement of transportation rates and rules for their control. The chief interest to business men throughout the country in this tendency is, that it will probably result in permanently lower traffic charges. The outflow of Eastern capital into the West, has given Western enterprise a leverage and potential capacity which will place it in a position in a very short time, to be very largely independent of the Eastern sources of supply. Fuel is declining in price throughout the West. La or is relatively cheaper than it was three years ago. Material and machinery are lower. All these influences are attracting manufacturing enterprise, not exactly from the East to the West, but are stimulating local manufacturing enterprise throughout the West, as has been done on such a large scale throughout the South in the past five years. The Long and Short Haul Clause is helping this decentralizing industrial policy. These general considerations have been referred to for the purpose of attracting attention to the new and favorable influence at work throughout the newer States of the West, and that is the development of a self-supporting capacity, to furnish manufactured products and merchandise of all kinds. The people of the far West, instead of sending to Boston for shoes and to the East for textile goods, or for special machinery, paper, hardware and a host of products, the manufacture of which, the New England States have monopolized to a considerable extent, will establish industries of these kinds among themselves. The effect of this departure will be the building up of large industrial communities similar to those we have in the East. The building of shops, mills, factories, houses and of machinery establishments, large and small, will grow out of this expansion. The manufacturers of the Northwest have observed this movement for a year or two, and they have been wisely preparing for it by an extension of purchases of timber-territory throughout Michigan, Wisconsin, Canada, and in Kansas and Arkansas, and throughout the lumber regions east of the Mississippi River. Coal-producers have been preparing for it by purchasing valuable coal-deposits throughout the Northwest and West, wherever they are to be found. Oil and natural-gas projectors have been scouring the region west of the Mississippi for evidences of oil and gas, and have been spending considerable money in boring. The demand for lumber all over the West has been increasing in a remarkable way during the past year. Building enterprise is moving ahead steadily. In some localities it has assumed booming proportions. Towns unknown to the maps are growing in population, and there is a demand for all kind of building material in the vast region of country between the Mississippi and Rocky Mountains. Travelling agents for manufacturing establishments who have been making pioneer tours through these regions return with rather enthusiastic reports as to the possibilities of that section. Business may fluctuate in the East, but it will improve there. Iron-making may suffer in Pennsylvania, but it will grow rapidly in Alabama. Wool-growing may suffer in Ohio, but Texas will gain. Money-lending in New York may be unprofitable, but the demands from Western sources will offset the dulness in the East. Industries may suffer depression in the New England and Middle States, but there will be a compensating expansion West. House and shop building may progress rather slowly in the older section, but in the new West and South, there will be such a demand for material, capital, enterprise and labor, as will sustain a healthy activity throughout the country. The actual trade conditions can be summarized in a very few words. Manufacturers everywhere are purchasing cautiously. The boot and shoe manufacturers of New England are still ahead of last year. Hardware manufacturing establishments are full of orders, and have excellent prospects for the season. Cotton-mills are nearly all running full time. The woolen manufacturers expect to be busy during the last seven months of the year. Makers of machinery are nowhere complaining of restricted orders. The iron trade is suffering from dulness and low prices. The distribution of lumber throughout the East is very heavy. The makers of all kinds of railroad equipments and supplies are pretty full of orders; the locomotive-works being particularly full. The car-builders are unable to accept all the orders that are presented. The smaller industries throughout the country are suffering from a slackening demand, but there are evidences that within the next thirty or sixty days a better condition of things will prevail. Western factories and shops are working to 80 or 90 per cent of their capacity. Commercial failures are fewer than last year. There is a tendency on expansion of credits among jobbers and shippers in all branches of trade. No financial stringency is felt in markets East or West. An honest difference of opinion exists as to the wisdom of pending measures in Congress to maintain an easy volume of money for business requirements. The interests of the producers throughout the country are being watched with greater care than ever before in our history. Speculators and manipulators of stocks have less opportunity than ever before. Government stands ready to extend its paternal assistance, if necessary, against trusts and monopolies, which have proved too strong for outside enterprise. The interests of the mass of the people were never more assiduously conserved, and there is no reason for predicting evil or injury to them.

S. J. Parkhill & Co., Printers, Boston.

THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. XXIII. No. 643.

Copyright, 1888, by TICKNOR & COMPANY, Boston, Mass.

APRIL 21, 1888.

Entered at the Post-Office at Boston as second-class matter.

CONTENTS

BY the death of General Quincy A. Gillmore, which occurred in Brooklyn, N. Y., last week, the country loses an admirable example of the sort of thorough and intelligent scientific as well as military men which our West Point training tends to develop. General Gillmore was born in Ohio in 1825. He graduated at West Point with high honors in 1849, and was assigned to duty as officer of engineers, assisting in the construction of the great Fortress Monroe, as well as other fortifications. Returning to West Point, he served for three years as instructor in military engineering, and was afterwards detailed to supervise the construction of various forts on the Atlantic coast. During the war he displayed a courage in action, as well as military skill, which gained for him the rank of Major-General, with the command, first of an army corps, and then of the Department of the South. The return of peace gave him leisure for private business, and, besides the Government work with which he was always intrusted, he was chief engineer of the Kings County Elevated Railway, and a commissioner for the new Croton Aqueduct. Amid his many occupations, civil and military, he found time to write some of the most useful books on engineering subjects in existence. His work on "*Limes, Mortars and Cements*," is the best general treatise on the subject that the American student can obtain, and his little octavo book on "*Roads*" is also full of just such information as architects and engineers require. Besides these two, which are found in the library of nearly every engineer, and of very many architects, he wrote two or three treatises on some of the military operations of the war.

ACCORDING to the New York *Times*, the promise of the beginning of the season has been kept, and the present season bids fair to be one of the most disastrous that the insurance interest in New York has ever experienced. According to the official statistics for last year of twelve of the best known companies in New York and Brooklyn, while their income from premiums was less than eight million dollars, their disbursements amounted to about nine and one-half millions, leaving a net loss of more than a million and a half dollars, of which one company, the Phœnix, of Brooklyn, lost eight hundred and fifty thousand, and the Continental about three hundred and twenty thousand. Many, even of the strongest companies, materially diminished their surplus by the year's business, and it is said that two of them were obliged to assess their stockholders during the year to make good inroads upon their capital. This season the prospect seems to be worse than ever. Besides the extraordinary frequency and destructiveness of fires, the New York Tariff Association has been dissolved and reckless cutting of rates is everywhere practised. Insurance on city dwelling-houses, which a few years ago was uniformly held at twelve dollars and a half per thousand for five years, has this year been extensively sold at one dollar and a half per thousand for the same term, or less than one-eighth the former rates, and mercantile and manufacturing risks are rapidly taken at half the premiums charged by the old tariff. It is gratifying to observe that this condition of the insurance business, however unpleasant to the underwriters, has already led to a care on their part as to the character of the risks they insure, which was formerly unknown. The more narrowly the insurance companies are compelled to count the chances of loss by fire, in a given structure, the more they and the owners for whom they insure will learn to appreciate the care and knowledge of a conscientious architect, and we shall hope before long to see decided evidence of a disposition, which, indeed, is already indicated by certain symptoms on the part of the underwriters to come to a better understanding with the architects; and, instead of showering objurgations on them on all public occasions, to point out to owners the value of careful planning and design; to make it worth while, by allowances in premium rates, for owners to employ architects who can give them such planning and design, and, where possible, to discuss points of construction with the profession, and join in making needed experiments upon new materials or methods of building.

WE are requested to call attention to the series of prize essays, prepared under the invitation of the American Public Health Association, at the expense of Mr. Henry Lomb, of Rochester, who devised this way of placing the best information on sanitary subjects before his fellow-citizens in the most available shape. The series, as so far published, consists of four pamphlets; the first on "Healthy Homes and Foods for the Working Classes;" the second on "The Sanitary Conditions and Necessities of School Houses and School Life;" the third on "Disinfection and Individual Prophylaxis against Infectious Diseases," and the fourth on "Preventable Causes of Disease, Injury and Death in American Manufactories and Workshops." The first of the series is by Professor Vaughan, of the University of Michigan; the second by Dr. D. F. Lincoln, of Boston; the third by Dr. Sternberg, of the United States Army; and the fourth by Mr. George H. Ireland, of Springfield, Mass., and it is hardly necessary to say that all of them contain, condensed in small space, an immense amount of the most useful information. We shall have occasion later to speak of some of the special points, but the books themselves should be in the hands of all those who have any interest in the subject on which they treat. With true generosity and consideration, Mr. Lomb provides for the sale of the books at a cost which barely pays the expense of printing, No. 1 being sold, in English or German, for ten cents, while the other three cost five cents each; and Dr. Sternberg's work on infectious diseases can be had in English, German, French or Flemish.

MR. THOMAS FLETCHER, of Warrington, England, whose name and address ought to be kept in mind by those interested in the science of heating, has devised a new method of using a gas flame, which, by means of a sort of blow-pipe, can be made to melt a hole in a few seconds through a plate of iron or steel a quarter of an inch thick. Even thick plates, with a little longer time, can, as the *British Architect* says, be penetrated by the blow-pipe flame as readily as a wooden door is pierced by a carpenter's tool. Ordinary people do not have much occasion for melting holes in iron plates, but, as has already occurred to a great many people in England, burglars and bank-robbers will find Mr. Fletcher's blow-pipe a valuable addition to their kit, and we may expect to see it utilized by them at once, just as they have already appropriated one of his earlier designs for furnaces, to enable them to melt down silver-plate more readily. The *British Architect* says that several bankers have already visited Mr. Fletcher's workroom to study the blow-pipe and consider whether any protection against it can be devised; but they do not seem to meet with much comfort. Mr. Fletcher says that he shall manufacture the blow-pipe in such a way that it will make a good deal

of noise in use; but he acknowledges that it can be constructed so as to act noiselessly, and some ingenious burglar will be very likely to discover a way of making this modification.

IN a recent number of *La Semaine des Constructeurs* M. César Daly describes in his characteristically graceful way a conversation with the great Henri Labrouste, which took place many years ago in the modest apartment of the founder of the *Revue Générale d'Architecture.* During the precarious infancy of the new journal, M. Daly lived in his editorial rooms, sleeping on a sofa among his books, and comforting his anxieties by little Thursday evening receptions, which were attended by many architects, artists and literary men of the highest distinction. Among the visitors was Labrouste, before whom one evening a discussion took place upon the merits of the mediæval architecture, which Viollet-le-Duc and others were just beginning to describe and explain. Labrouste was always much more of a listener than a talker, and on this occasion he listened intently, but went away without expressing any opinion. Two days later M. Daly was surprised at receiving a visit from Labrouste, who had been thinking over the discussion of Thursday evening, and had come to talk about it. Daly began the conversation by recalling Labrouste's well-known saying, that "Architecture is Ornamented Construction," and asked the other whether he considered this definition broad enough to include all architectural art. The great architect of the Bibliothèque Sainte-Geneviève, the inventor, we might say of a style which has not yet finished its career, replied earnestly that truthfulness was, in his belief, the foundation of the art of architecture. A deception, he said, was not only repulsive to him, but he believed that insincerity in art, as in everything else, was incompatible with lofty inspirations. Daly questioned him closely on this point, and finally proposed to him an example. From the marble mantel near which they were sitting a chip had been detached. It was necessary to cement it on again, and Daly asked Labrouste whether, in such a case, he would encourage the stone-cutter to manage the joining so as to imitate a vein in the marble block. Labrouste reflected a while on this question, but finally replied that he could not approve even this innocent deception, on the ground that its effect upon his own and other persons' minds would be demoralizing, and therefore unfriendly to true art. Whether he would say so now, after forty years of struggle in the architectural world to reconcile the "Truth in Art" maxims with real comfort and convenience, it would be hard to say; but Labrouste is at least entitled to the credit of having pursued his idea with an ardor which still gives the strongest impression to the students of his work.

AFTER so many years of waste and contempt, the slag from iron furnaces seems likely to become of some use in the world. Already it has been successfully employed in Lyons in the shape of bricks, cast into shape, and it has for some years been used, in a pulverized condition, in place of sand for lime mortar. Very recently, however, its application to mortar-making has undergone a change. Its chemical composition has always seemed to adapt it for uniting more closely with lime than it can when employed simply as sand; and it has now been found that, when ground very finely and carefully with lime, it forms a cement very similar to Portland cement, and nearly as good. As the iron slag is a waste product, which can be had for nothing in enormous quantities, while it is easily pulverized, and, for making the new cement, requires none of that subsequent baking and repulverizing which forms the Portland cement process, the new material ought to be extremely cheap, and if it is good, the art of building will have acquired a new and very useful material.

THE *Sanitary Engineer* quotes from the *Chronique Industrielle* an account of the fall of a meteor in Cochin-China. One evening, last autumn, the French officials at a post in that county observed a large meteor moving from west to east, which remained visible for about thirty seconds. A few days later a letter was received by the French Governor of the province from a local magnate in the district to the eastward, mentioning that, on the same evening that the meteor was seen, an unknown animal had stopped there in its flight, ploughed up the ground for a considerable distance, and then disappeared in the sky. One of the officers, with a missionary attached to the station, immediately proceeded to the ground and found the tracks of the "unknown animal," consisting of a pear-shaped furrow twenty feet wide, about a hundred feet long, and six feet deep, out of which the earth had been thrown with great violence. The bottom of the furrow was smoothly cut, without any trace of the foreign body which had ploughed it. Careful measurements were taken, which, when analyzed, showed that the cavity must have been produced by the impact of a heavy body which had subsequently bounded off. The weight of the flying body, it was estimated, must have been two thousand eight hundred and ninety-five tons, its maximum diameter twenty-six feet, and its length one hundred feet. The velocity of its flight at the moment of impact must have been two thousand metres per second, or about five thousand miles an hour. After striking the earth, its velocity was slightly retarded, but it left the ground with a leap which, it was calculated, must have extended over a distance of seven hundred miles, landing the projectile, at its next ricochet, in the middle of the China Sea.

IF there is anything more surprising than the explosive force of nitro-glycerine, it is certainly the carelessness with which that substance is handled. It is well-known that nitro-glycerine freezes at a temperature considerably above the freezing point of water, and scores of accidents have resulted from the reckless methods employed for thawing it. Years ago, when pure nitro-glycerine was used for blasting, a workman in Germany found one morning his can of explosive material frozen. Being in a hurry to begin work, he returned to the house, heated a poker red-hot, and started off to thaw the nitro-glycerine with this instrument. It is hardly necessary to say that he succeeded to perfection, the nitro-glycerine changing its condition with an energy which pulverized not only the operator, but all other surrounding objects. A few days ago, according to *Fire and Water*, five miners in Michigan brought a bent gas-pipe to a blacksmith's shop, where it was heated and straightened. Without waiting for it to cool, they then filled it with dynamite, which immediately exploded, killing them all. Almost at the same moment a man in New Jersey brought some blasting cartridges, to thaw them out by a fire. He accomplished this result by holding them on the flame for a suitable period, and is supposed to have dropped one during the process, for his remains were found in a fragmentary condition sixty feet away. At Richmond, Indiana, on the same day, six tons of dynamite, which had been stored on a farm, exploded, blowing a horse and wagon to pieces, excavating a pit fifteen feet deep, and twenty-five feet in diameter, injuring a woman a quarter of a mile away, and breaking every window in a neighboring village.

AS the exhibition of the drawings for the New Boston Public Library just opened at the Old State House in that city is but a fleeting show, we call attention to it to-day although we propose to consider the matter from another point of view in a subsequent issue, and we trust that all draughtsmen and as many laymen as possible will visit the exhibition, and judging by the steady stream of visitors that passes into the room there is a fair chance that some of the lessons the occasion presents may be remembered. Here are the drawings, the perspectives, the elevations, the plans and "such other drawings or models as the competitor may choose to present," that building-committees in search of designs for some costly building used so blandly to call upon architects to furnish for their inspection and selection, on the understanding that what the Committee is pleased to call the prize-designs shall become the absolute property of the Committee in return for sums which will, in most cases, barely cover the mere cost of the drawings. It hardly seems possible that the average committee-man, who though he may not know how long it really takes to put line upon line is generally a man of good common sense, can see such an exhibition as this and not understand that here is shown work that it has cost the architects not only hundreds but probably thousands of dollars to produce, while it is only the beginning of the work that must be done in the way of drawing alone. Time, study, calculations, correspondence, superintendence and all the other things which are to be paid for by the usual commission are but vaguely suggested to the lay mind by what is here shown, though surely the big piling-plan must hint that an architect's life is not all cakes and ale, that he has other things to consume his time and require his anxious consideration than the making of pictures — even so notable a one as that rendered by Mr. Langerfeldt in his best style — which is but the last of a series of three elaborate perspective studies.

MEMORIALS TO CAPTAIN NATHAN HALE.[1] — II.

Model for Statue of Nathan Hale. E. S. Woods, Sculptor.

For the past thirty years there has been an occasional allusion in newspapers to the necessity of fitly remembering Ha.e by a statue, and that was all. A few years ago when Cyrus W. Field, was active in erecting and re-erecting his monument to commemorate the spot where André met his fate, there came into existence, especially in Connecticut, a kind of protesting vitality against Mr. Field's too ardent endeavor, and in favor of "doing something for Hale" in the way of remembrance as an offset. At first, a plain shaft was proposed, and upon which, as its chief distinction, a long and flourishing inscription was to be placed. The production of the inscription closed these efforts for this memorial. As long ago as 1870, a distant connection of Hale, who felt that his fame had been neglected, urged an American sculptor in Paris to study the subject and make sketches of a statue, in the hope that prominent men in Connecticut would interest themselves in carrying the matter to a worthy conclusion. The sculptor heartily entered into the proposition, but receiving neither private or public encouragement, the project was abandoned.

At the centennial celebration of the battle of Groton Heights, in September 1881, the Rev. E. E. Hale delivered an address on Nathan Hale. At its close, Mr. J. J. Copp, secretary of the Centennial Committee, proposed a resolution "that the Connecticut legislature be memorialized to appropriate funds for the erection of a statue to Nathan Hale, the Martyr Spy, in the Capitol at Hartford. The resolution was unanimously endorsed by the audience, and Senator J. R. Hawley, Ex-Governors R. D. Hubbard, and Charles R. Ingersoll, Rev. Dr. Leonard Bacon, Mayor Robert Coit, and Hon. T. M. Waller were appointed a committee to assume charge of matters relating to the resolution.

It is also stated in the Hartford papers that in a memorial address at New Haven in 1881 the Hon. R. D. Hubbard suggested that a statue of Hale be placed in the Capitol. A resolution to this effect was introduced during the legislative session of 1882 and Messrs. Waller, Hubbard and Coit were appointed a committee to procure a statue, but nothing was done. At the session of 1883, in support of a like resolution, introduced by Hon. E. S. Cleveland, Hon. R. D. Hubbard delivered an address, which, for dramatic character, deep and pathetic understanding and appreciation of the part which Hale acted, for eloquence and conciseness, and the realization of the high mark set by Hale in his life and death as an example to his countrymen, stands alone, of its kind, in American oratory. It brought the martyr back, after a hundred years of oblivion, a living presence to the sons and grandsons of his own generation. Nor did be well remain even as an inspiration, for, quite forgetting the strange and wondrous vision, the pitiful sum of five thousand dollars was doled out to buy a bronze image of what they had seen but had not understood. Hale returned to the shades and the burning words of the orator followed him.

For various reasons, death and otherwise, the committee on the statue was changed during the first years of its history until it finally became composed of the Governor (chairman *ex officio*), Hon. R. Coit, Hon. H. Barnard, C. D. Warner and E. S. Cleveland. This committee advertised for models in public competition, and then began a history so foreign to honor and decency that for the credit of the State and the majority of the committee that represented it, we would stop here were it not that some points in it are worth alluding to.

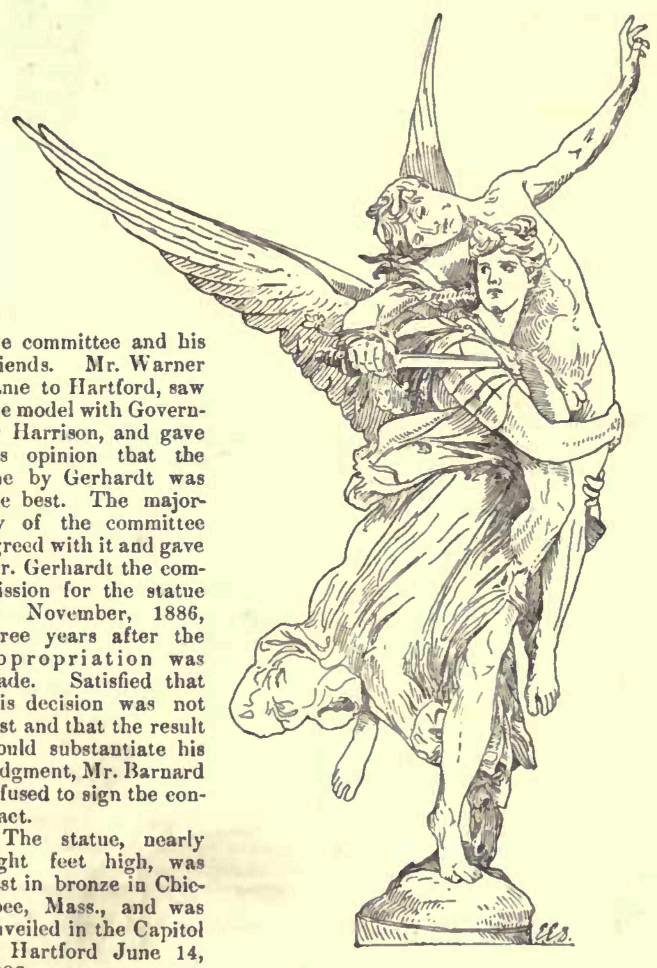
Three competitors offered models for a statue larger than life, Conrad, Gerhardt and Woods, all of them living in Hartford. The model of the first was discarded, leaving the contest between the last two. Seeing that the committee were actuated solely by political and personal influence, Mr. Barnard made every effort to have the competition conducted upon the art merits of the models presented. His efforts, extending over a period of nearly four years, were balked at every step. He travelled from New York to Boston, inviting sculptors of reputation to make a sketch, assuring them that so far as he was concerned, they should be treated fairly. He met with refusal everywhere. The general feeling among those he consulted was not in favor of the way competitions were carried on, and besides, the contention over the Hale had already become unsavory.

In order to the better understanding of the character of this contest and its eventful result, it is necessary to speak of the two competing sculptors.

Mr. Gerhardt was the protegé of "Mark Twain" and had lately returned from Paris, where he had been studying for a year or two in the Government school of fine arts, having been sent there by the distinguished humorist. Mr. Woods, a native of Nova Scotia, was entirely untaught in the art of sculpture, though he had practised it during spare hours taken from his other work for some ten years. A few busts and bas-reliefs comprised his productions in this art.

Both of these sculptors made several sketches each, large and small, of their proposed statues of Hale. The committee did not decide in favor of either model, because Mr. Barnard was determined that his decision should be given in favor of the best model, independent of any external influence and supported by the judgment of those who knew more than he did of the subject under consideration. Matters ran along in this way until 1885, when the Hon. H. B. Harrison, of New Haven, was elected Governor. He then became a member of the committee, and the legislature of that year added to it the Rev. Francis Goodwin, of Hartford. This gave new life to the committee, and, pushed on by one influence and another, it set to work to accomplish something. In the meantime, Mr. Gerhardt had retired his model and the committee gave him eight weeks to make another. New political influences had also entered into the contest. Governor Harrison was also desirous that the models should be examined by an expert, and at his request Mr. Olin M. Warner, the sculptor, of New York, was invited to come to Hartford and perform this task.

Previous to this Mr. Barnard had described the models of both contestants to artists in New York and Boston, and all had decided that Mr. Woods's was the only one entitled to any serious consideration. The latter's was always open to and was seen very generally by the public, while the model of Mr. Gerhardt was only shown to the committee and his friends. Mr. Warner came to Hartford, saw the model with Governor Harrison, and gave his opinion that the one by Gerhardt was the best. The majority of the committee agreed with it and gave Mr. Gerhardt the commission for the statue in November, 1886, three years after the appropriation was made. Satisfied that this decision was not just and that the result would substantiate his judgment, Mr. Barnard refused to sign the contract.



"Pro Patria." M. J. A. Marcie, Sculptor.

The statue, nearly eight feet high, was cast in bronze in Chicopee, Mass., and was unveiled in the Capitol in Hartford June 14, 1887.

Three days before this, June 11th, *Harper's Weekly* published a wood-engraving of the statue, accompanied with an explanatory and complimentary article. It thus discourses of the artist and his long looked-for work:

"It is the work of Karl Gerhardt, a young sculptor of Hartford, who pursued his studies in Paris under the best masters, and returned to this country with their highest commendation, and has already

[1] Continued from page 173, No. 642.

made good their prophecies of his success. He has recently sent to the foundry in this city an equestrian statue of Israel Putnam, destined to stand in his native town of Brooklyn, Conn. (also a commission from the legislature), which is thought by those who have seen it in plaster to be a work of uncommon dignity and beauty. Needless to say that if Mr. Gerhardt has succeeded in the rarest of all artistic achievements, an equestrian statue — for the wide world has few good ones — he takes his place at once among the first American artists. As the artist had no portrait to guide him, he has been free to make a heroic figure of a youth, of the New England type in features, and to give him that fire and action which his character revealed in his exploit seems to require. As it could not be a portrait statue, the figure itself must tell the story."

Referring to Hale's last words, the article continues:

"They are the key-note of the artist's treatment. Unwilling to perpetuate the ignominy of his execution, he has seized the moment when Hale may be supposed to have said these words — erect, facing his captors with flashing eyes, his hands thrown back in token at once of self-sacrifice, surrender and triumph. The action, to be sure, is momentary, but in no other way than by some action could the artist tell his story. The attitude is noble, the face full of the expression of the heroic mind, the whole figure instinct with it. So perfectly has the artist infused the bronze with the sentiment of this noble utterance that even the shoulders and back declare it. We hear that a *replica* of this statue, with a slight change in the pose, will be set up in New York."

In its report of the ceremony of unveiling, at which less than two hundred persons were present, and only three members of the committee, the Hartford *Courant* says:

"The desire for a simple ceremony that should have intellectual rather than spectacular interest was admirably carried out. There was no procession, no music, and no display, but those who were present will remember the order followed as one that appealed immediately to their sense of fitness, propriety and dignity."

The presentation address was made by one of the committee, Mr. C. D. Warner. Of the statue the orator observed:

"To-day in all its artistic perfection and beauty it stands here to be revealed to the public gaze." . . . "This is not a portrait statue. There is no likeness of Nathan Hale extant. The only known miniature of his face, in the possession of the lady to whom he was betrothed at the time of his death, disappeared many years ago. The artist was obliged, therefore, to create an ideal figure, aided by a few fragmentary descriptions of Hale's personal appearance. His object has been to represent an American youth of the period, an American patriot and scholar, whose manly beauty and grace tradition loves to recall, to represent in face and in bearing the moral elevation of character that made him conspicuous among his fellows, and to show forth, if possible, the deed that made him immortal. For it is the deed and the memorable last words that we think of when we think of Hale." . . . "For all the man's life, all of his character, flowered and bloomed into immortal beauty in this one supreme moment of self-sacrifice, triumph, defiance."

After presenting the statue to Governor Lounsbury, Mr. Warner closed his address by saying, "Let the statue speak for itself."

Nathan Hale, in the Capitol, Hartford, Conn. Karl Gerhardt, Sculptor.

The Hartford *Times*, in its description of the ceremonies, alluded to the meagre attendance; to the claim that Hale's memory had to the remembrance of his countrymen; suggested these facts as the strongest possible argument for the study of the history of the United States, but made no reference whatever to the statue.

The Hartford *Post* of June 14, had the following criticism:

"Although no portrait of Hale is in existence, one who knew him gave our fellow-townsman, I. H. Stuart, information which he placed in his little book on the martyr-spy. The features are there thus given: 'Full face, light blue eyes, light rosy complexion and hair of a medium brown.' The ordinary observer can quickly tell whether there has been any attempt to make the face of the statue like Hale's. It is long, not full, and the eyes are dark holes, portraying the blackest. Light blue eyes can be approximated even in bronze. An inspired article in *Harper's Weekly* mentions the absence of portrait as an excuse for making free with 'a heroic figure of youth of the New England type in features.' But it is no excuse for not bringing a statue of Hale to the highest portraiture point possible from tradition and record — to say nothing of the remarkable freedom with which 'the New England type' has been maltreated. The observer to-morrow should look at the design of the nose, at the length and breadth of the neck — all out of proportion — and undeveloped back of the head, with the absence of character. The young man whom Connecticut and the nation delights to honor was of an intellectual and athletic cast. There are few marks of intellect in the face; the phrenologist as well as the anatomist is certainly abroad so far as Mr. Gerhardt is concerned.

"But though the face, head and neck are out of proportion and show nothing that Hale possessed (except perhaps the very pretty mouth that must have been one of his attractions in ladies' eyes) there is something more flagrantly unjust to him. Mr. Stuart records from tradition and history that 'in height he was about five feet and ten inches, and was exceedingly well proportioned. His figure was elegant and commanding. He had a full, broad chest. . . . The elasticity of his frame is well attested by feats which he used frequently to perform in New London. He not only, says Colonel Green, would put his hand upon a fence as high as his head and clear it easily at a bound, but would jump from the bottom of one empty hogshead over and down into a second, and from the bottom of the second over and down into a third, and from the third over and out like a cat.' An example of long jumps on New Haven green when he was a student is given together with his love for wrestling matches when in the army.

"What sort of a figure has the artist given? That of a deformed man who could not have done the feats recorded of Hale.

"Instead of the 'full, broad chest' the breadth is very much less than standard normal — to say nothing of Hale's true proportions. The shoulders have no graceful curve where they join the neck, and are not equal in their unevenness. The hips are deficient; the legs have no shapeliness; there is no elasticity in the feet; the muscles of the calves are misplaced; the ankles are out of proportion; the shoe-counters cut cruelly into the flesh. The hands are those of a hard-working, unsensitive person; veined like a workingman's and as if the person delineated were forty years years of age instead of

twenty-one. Whether the spirit of the statue — the idea it embodies — can excuse these defects of modelling can be decided by the observer. The attitude is as if the bronze had seen its father's ghost or were complaining that its hands had been soiled.

"An unfortunate thing concerns the pedestal. The martyr-spy's last words run down hill towards the north, at a grade of say a quarter of an inch. This 'out of level' is easily noticeable.

"A replica of the statue, it is said, will be set up in New York with a slight change in the pose. We understand that the hands will be tied behind instead of being allowed to run riot in the present fashion."

The Hartford correspondent of the New York *Tribune*, writes thus:

"Not one word of favorable comment has been said in any of the local papers about the statue of Nathan Hale unveiled at the Capitol Thursday. It is disappointing even to the friends of the sculptor, Mr. Gerhardt."

The New Haven *Register* of July 2, 1887, alluded to Mr. C. D. Warner as a eulogist of the sculptor, to his apologetic explanation of the statue in his address, and criticised him for the questionable taste he had displayed in encouraging and sanctioning the production of a statue, that it pronounced worse than the "Custer" at West Point, or the "Morse" in Central Park, two statues that have been hidden from the public gaze because of their repulsiveness. It also reflects severely upon the misguided judgment of Warner the sculptor.

"Quand Mame." M. J. A. Mercie, Sculptor.

Regarding the anticipatory encomiums of the article in *Harper's Weekly*, it says:

"From every fine interpretation, both literary and artistic of Hale's last words, and as a just estimate of his character, there is only one conclusion to be reached in regard to his conduct during those indescribable moments when he gave expression to that immortal sentence. It would not be that he was straining his body like a boor, and gesticulating like a poor actor. The gibbet is not an encourager of bravado.

"There is no doubt, however, about what the figure means. It tells its story in unmistakable language. It is the story of a culprit; a conscious thief, who thinks that his crimes are not known, and that his willing offer to be searched will prove his innocence."

Of the assertion that "the very shoulders and back of the statue" declare the perfection of the artist's infusion into his bronze of Hale's noble utterance, the writer adds:

"It is true that the shoulders and back declare something of importance to the critic, if not to the eulogist, for in its frantic efforts to declare its innocence the statue has, by some unknown process of banting considerably reduced the depth of his chest, and so deranged his anatomical construction that the very calves of his legs have fallen quite a distance nearer his heels than the locality they usually occupy on a well proportioned figure. For an emaciated saint these little incongruities might pass unnoticed, but in an ideal statue of 'an American youth of the period,' they are decided imperfections."

It is safe to say that no statue ever set up in the United States, not even the "Custer" at West Point, or the "Morse" in Central Park, has received such complete and just condemnation.

If it is true, as some affirm, that the souls of the dead return to earth on missions of love, or to protest against continued wrongs done to their memory, who shall say that Nathan Hale was not present in the Hartford Capitol on June 14, 1887, as an invisible but saddened spirit, to witness the conclusion of a century's fruitless exertion by his native State to produce a fitting symbol of his immortality.

Many of the citizens of Hartford believed from the first that the Woods's model was superior to that of Gerhardt and that it possessed certain indications of a true art-sentiment and understanding that were wholly lacking in that of the latter. This was all the more noticeable from the fact that Woods had been deprived of all opportunities of art-study which his rival had freely enjoyed, and which were put forward by his friends as unanswerable reasons for his artistic superiority. Mr. Barnard, especially, believed that the more modest general action of the Woods model was a finer interpretation of Hale at the moment of his execution, or as an action of self-sacrifice, than that displayed by the model of his competitor. He also thought that the entire expression of the figure should centre in some single gesture, and concentrating the whole action of the figure to that point. This, he felt, was correctly indicated by the position of the right hand, as shown in this model, which also recommended itself from the fact that it was made under very disadvantageous circumstances, without the use of a living model, or the assistance of the experience of professional or friendly criticisms. As a piece of modelling, it was judged to be, by artists of long experience in the Paris art schools, a surprising piece of work, entitling its author to the fairest treatment and the most generous encouragement.

Many of the citizens also believed that Woods had been unfairly treated in the competition, and they went to see the "Hale" in the Capitol with an indignant curiosity. They were not surprised, but their indignation immediately formulated itself into a protest of a just and most praiseworthy nature. They proposed to raise five thousand dollars for the purpose of putting Woods's model into bronze, and erecting it in some public place in the city. More than half of this sum was raised at once, and the remainder is assured.

Mr. Woods is now engaged in perfecting the correct ideas foreshadowed in his model. The right hand will be placed open, instead of closed, on the left breast, and the left hand somewhat diminished in its action: all, in order to concentrate the entire action of the figure in a firm and simple expression.

While the Hartford contention was going on, interest in Hale's memory was awakened in Brooklyn, N. Y. The Franklin Library Club of that city appointed a committee to consider the question of a statue. The sons of the Revolution of New York City also became interested, and at first proposed to obtain a copy of the Hartford "Hale," but on examination they decided to make an effort to procure a better representation of the martyr-spy. Mr. Woods's model was sent to them for exhibition, and several other sculptors have consented to make designs.

SOME INCIDENTS CONNECTED WITH HALE'S LIFE.

The school-house where Hale taught school, in New London, is still standing. Two granddaughters of Alice Adams, Nathan Hale's betrothed, live in Hartford — Mrs. Dr. Hastings and her sister, Miss Elizabeth B. Sheldon. Miss Sheldon was at the unveiling of the Hale statue.

. . . .

The tradition is that Alice Adams married twice after Hale's death. The fact is that she was already a widow while engaged to Hale, and, though she did marry after his death, it was under peculiar circumstances, none of which are inconsistent with the belief that Hale was the only man whom she really loved. The romantic story is essentially as follows:

Nathan Hale's father married, for his second wife, the widow Abigail Adams, of Canterbury. She had two or three lovely daughters, grown up or fast growing up, and Mr. Hale had several sons of corresponding age and attractiveness. Soon after the families became one the sons began falling in love with the daughters, and one pair of them married. After this, Nathan developed a tenderness for Alice, though she was scarcely more than a child. The father Hale made up his mind that there had been enough of this intermarrying, and summarily shut down on this match, and sent Nathan off for his education for the ministry.

Then came an excellent offer for Alice's hand. Eliphalet Ripley, a man of property and character, some years her senior, asked her in marriage. She was of a yielding nature, and she gave way to the pressure brought to bear upon her, and became Mrs. Ripley at the early age of sixteen years. Within two years he died, and she was a widow at eighteen, with a comfortable little property. About this time Nathan Hale came home, and would tolerate no more opposition. He and Alice avowed the affection they had had and became engaged, but they could not be married at once. Then came the war, and Nathan went off and met the fearful fate that was their final separation.

She resolved thereupon never to marry again, but the person who had charge of her property proved dishonest and her entire possessions were lost. Meanwhile the reputation of her beauty spread far and wide. She was known as "the handsomest girl in Connecticut." William Lawrence, of Hartford, familiarly called "the marquis," son of Treasurer John Lawrence, made up his mind to win her for his wife. Her friends again urged her to marry and she again yielded. She became Mrs. Lawrence and lived in Hartford until she was eighty-eight years old. Her last words were not "Write to Nathan," but "Oh, call Nathan." In her later years she grew somewhat childish, her mind reverting to the people and scenes of her earlier days.

Mrs. Alice Adams Lawrence frequently spoke of Nathan Hale to her daughter, who in turn repeated the talk to her daughter. Miss Sheldon says she described him as six feet high, straight as an Indian and remarkably athletic and manly. T. H. Bartlett.

The Dessemination of Dry-rot. — It is said that the germs of "dry-rot," the enemy of builders, can be carried by saws and other tools which have been in contact with infected wood, and that such transmission and impregnation is often the cause of the mysteriously rapid decay of originally sound timbers. — *Exchange.*

CHICAGO

BUILDING STRIKES OVERSHADOWED BY THE GREAT RAILROAD STRIKE. — A NOVEL WAY TO MOVE A BRIDGE.

SO entirely have we been living in the atmosphere of strikes during the past month that they seem almost to have become a natural condition of affairs, and a few more or less cause no remark. The great railroad struggle which has severely crippled some lines of business has had but little effect upon the general building trade. Naturally, isolated cases are to be found where the transportation of some particular material has caused worry and trouble on the part of the contractors and architects and hard words on the part of the owner, but no serious and widely-spread difficulty has arisen. Of all the dealers the lumbermen have complained the most bitterly, their business being so intimately connected with transportation, the stoppage of freight at once affects them, and this was especially vexatious, as at the present moment they are most anxious to put their best foot forward. Owing to the equalization of rates due to the Inter-state Commerce Law, other lumber centres are making deep inroads into Western territory that the Chicago dealers had almost commenced to regard as their own private preserves. As a result they have stormed and have formally met and resolved several resolves, which fill half a column in the daily papers, but all the same their relief was very slow.

In the midst of all this clashing of loud cymbals, or something else, by the railroads and their employés, the strikes of the building trades have been almost unable to obtain any public recognition and in sheer disgust have nearly been obliged to hide their diminished heads. The painters tried to go out with a great flourish of trumpets, but the aforesaid cymbals so completely drowned their little blare that a dozen or so lines in the daily press was all that they could obtain. Such poor recognition and lack of enthusiasm on the part of the general public seems to nearly have caused a collapse at once. However, they have held out bravely for less work and more pay and have succeeded in causing considerable trouble to their employers. There are, however, so many non-union painters and business is so comparatively light for this season of the year, that it is now more than evident that they will shortly be obliged to work a little more and be paid something like other mortals in proportion to the value of the work they do. One branch of the carpenter's fraternity is also trying to make it lively for every one concerned, but in this case they are antagonized by the Knights of Labor division of that trade. The Knights were so modest this year as only to ask for about one-half of the earth, and this demand having been conceded, they gaze in virtuous indignation on the brotherhood which demands three-quarters of the planet at one fell swoop. Not to be behind the times, the hod-carrier has threatened to strike; for what is not positively and publicly asserted, but it is also believed to be for less work and more pay. The plasterers feel that they are aggrieved and some of them have threatened to strike, but publicity in the daily press not being given to these things as much as their promoters would like, they have all proved decidedly abortive. Probably no really serious interference with the building business will take place this spring. All real grievances in most of the trades can be readily arbitrated, and the sober-minded portion of the workingmen are not anxious to lay off for a month or two, especially when many persons consider the outlook for building for the coming season to be only fair. In fact, the immediate future seems to show so comparatively little extremely large building that people are apt to get the idea that things will be very dull. This, however, is not really true, for the number of smaller though good buildings promises to be very large, and undoubtedly about the same number of miles of cheap houses will be built as in the past few years. As for the extremely large and heavy constructions, the demand caused by the removal of the Board of Trade has no wbeen about supplied, and hereafter such mammoth buildings will come only occasionally to the architects.

A rather novel bridge-moving (at least, novel for Chicago) has taken place here during the last month. One of the swinging-draws connecting the South with the North Side was floated bodily down the river, a distance of about one-eighth of a mile, and placed on a new foundation. Under each end of the bridge to be moved large scows were partially submerged and scaffolding built upon them until the underside of the roadway was reached. The water was then pumped from the boats and as a result the bridge was raised off the pier upon which it swung. All that remained was to tow the scows carrying the scaffold and bridge down the stream until the construction was over the new central pier prepared for it. The water was once more let in and the whole thing easily sank down into position upon the new foundation. As usual, many people were greatly exercised for fear the whole affair would topple over into the river, but the transit was safely accomplished, notwithstanding the float had but a few inches to spare in passing through Clark-Street bridge, and now Wells-Street bridge is calmly resting upon the central pier at Dearborn Street. Moreover, there seems to be but little doubt but that it will tranquilly repose there for some time to come, since the city fathers, owing to some little oversight, failed to appropriate any money to build the proper approaches on each side of the river. However, this small matter will probably be brought to their notice in the course of the next twelve months, so that some time in the course of the year after, if they cannot force other parties to build them, the necessary money may be appropriated.

In the meantime, the North-Siders have one less bridge for their use, but the knowledge that the old bridge was safely moved and not toppled over into the river, coupled with the fact that they can soothe their lacerated feelings by gazing at that very draw now swinging on the new pier, may serve to keep them in good spirits until at least a new bridge is completed at the place from which the one in question was moved.

In spite of this, the long-suffering inhabitants of the North Side are just now in high feather, for they think they begin to see the commencement of rapid transit and the consequent development of the distant parts of that quarter. At last the new street cable-railway has started, and by making use of the La Salle-Street tunnel under the river, many of the vexatious delays caused by open bridges are expected to be avoided and much more rapid time made to the northern suburbs.

THE ILLUSTRATIONS

[*Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.*]

DOORWAY OF HOUSE AT CORNER OF GLOUCESTER STREET AND COMMONWEALTH AVE., BOSTON, MASS. MESSRS. PEABODY & STEARNS, ARCHITECTS, BOSTON, MASS.

[Helio-Chrome, issued only with the Imperial Edition.]

GOTHIC TOWERS AND SPIRES. PLATES 10, 11 AND 12. — ST. PATRICK'S, PARTINGTON; SS. CUTHBERT AND MARY, CHESTER LE STREET, DURHAM; ST. MARY THE VIRGIN, HOUGHTON; ST. GREGORY'S, WELFORD; ST. GEORGE'S, METHWOLD; ST. MARGARET'S, CRICK; ST. MARY'S, MORSHAM; ST. WILFRED'S, BRAYTON; ST. MARY MAGDALENE, OXFORD, ENGLAND.

[Issued only with the Imperial Edition.]

PENNSYLVANIA COLLEGE, GETTYSBURG, PA. MR. J. A. DEMPWOLF, ARCHITECT, YORK, PA.

THE materials employed in this building will be common brick and Hummelstown brownstone, with local granite base all jointed in brown mortar. The interior finish will be in oak and southern pine. There will also be an arcaded stair-hall of three stories in moulded and plain buff brick, brownstone and Woodstock granite. In addition to the main staircase additional exits will be provided at each end of the building by means of iron stairs enclosed in brickwork with fireproof doors. The size over all is about 84′ x 174′, and the total cost including heating will amount to $100,000.

"PRO PATRIA." A GROUP BY LEFEUVRE.

As having an antithetical interest, this group is published at the same time with the sketch of the Nathan Hale statue, which will be found elsewhere in this issue.

FAST-DAY SKETCHES AT HINGHAM, MASS., BY MR. W. W. BOSWORTH, BOSTON, MASS.

THE I. D. FARNSWORTH SCHOOL OF ART, WELLESLEY COLLEGE, WELLESLEY, MASS. MESSRS. ROTCH & TILDEN, ARCHITECTS, BOSTON, MASS.

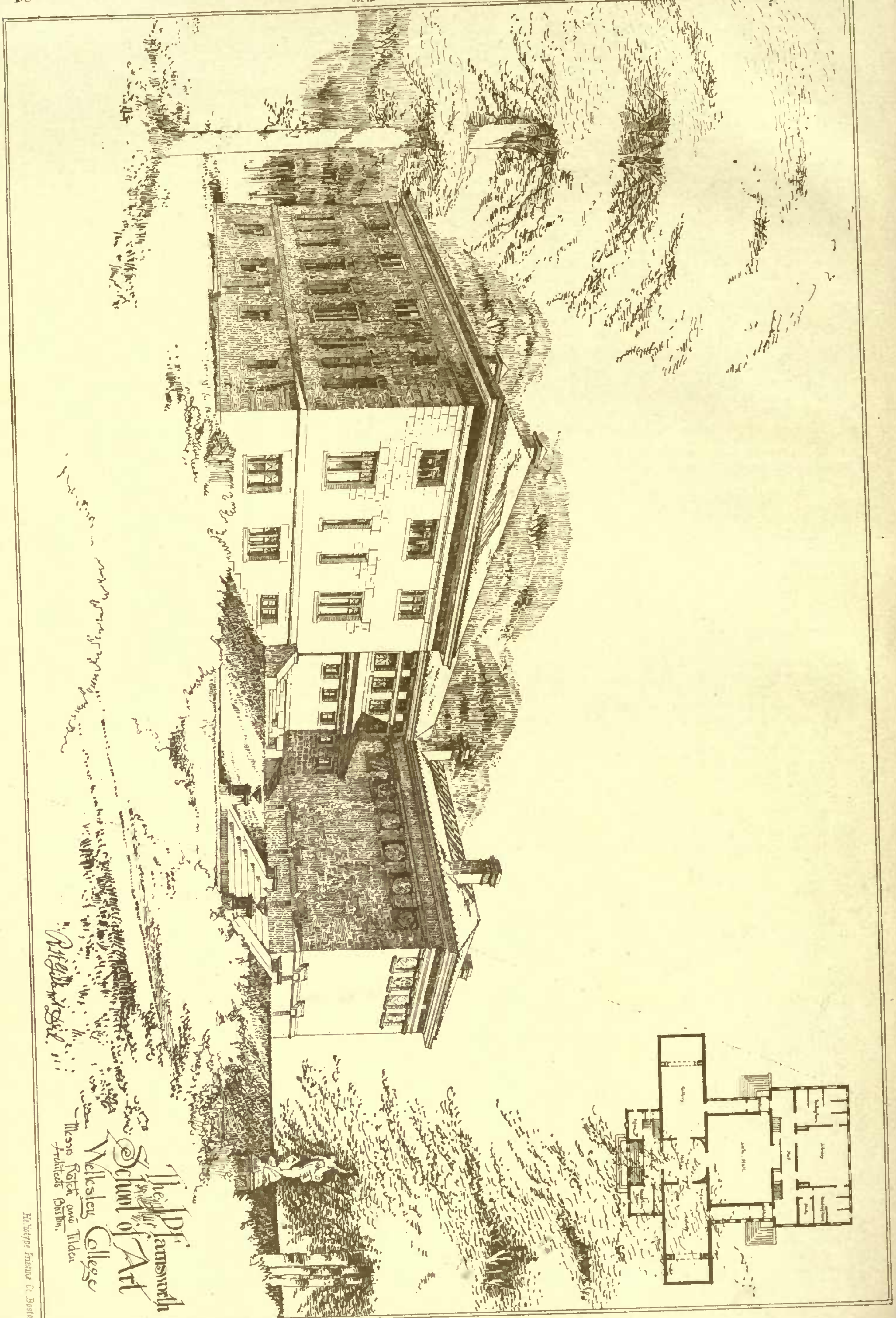
LONDON

THE SECOND READING OF THE REGISTRATION BILL. — APPROACHING DISSOLUTION OF THE METROPOLITAN BOARD OF WORKS. — SUCCESS OF THE EXAMINATIONS. — EXHIBITION OF SKETCHES OF OXFORD.

LONDON, March 31, 1888.

THE Second Reading of the "Architects', Engineers' and Surveyors' Registration Act" has been fixed for Wednesday, April 11th, and both sides are busy preparing for the conflict. A special business meeting of the Royal Institute of British Architects

COPYRIGHT 1888 BY TICKNOR & CO.

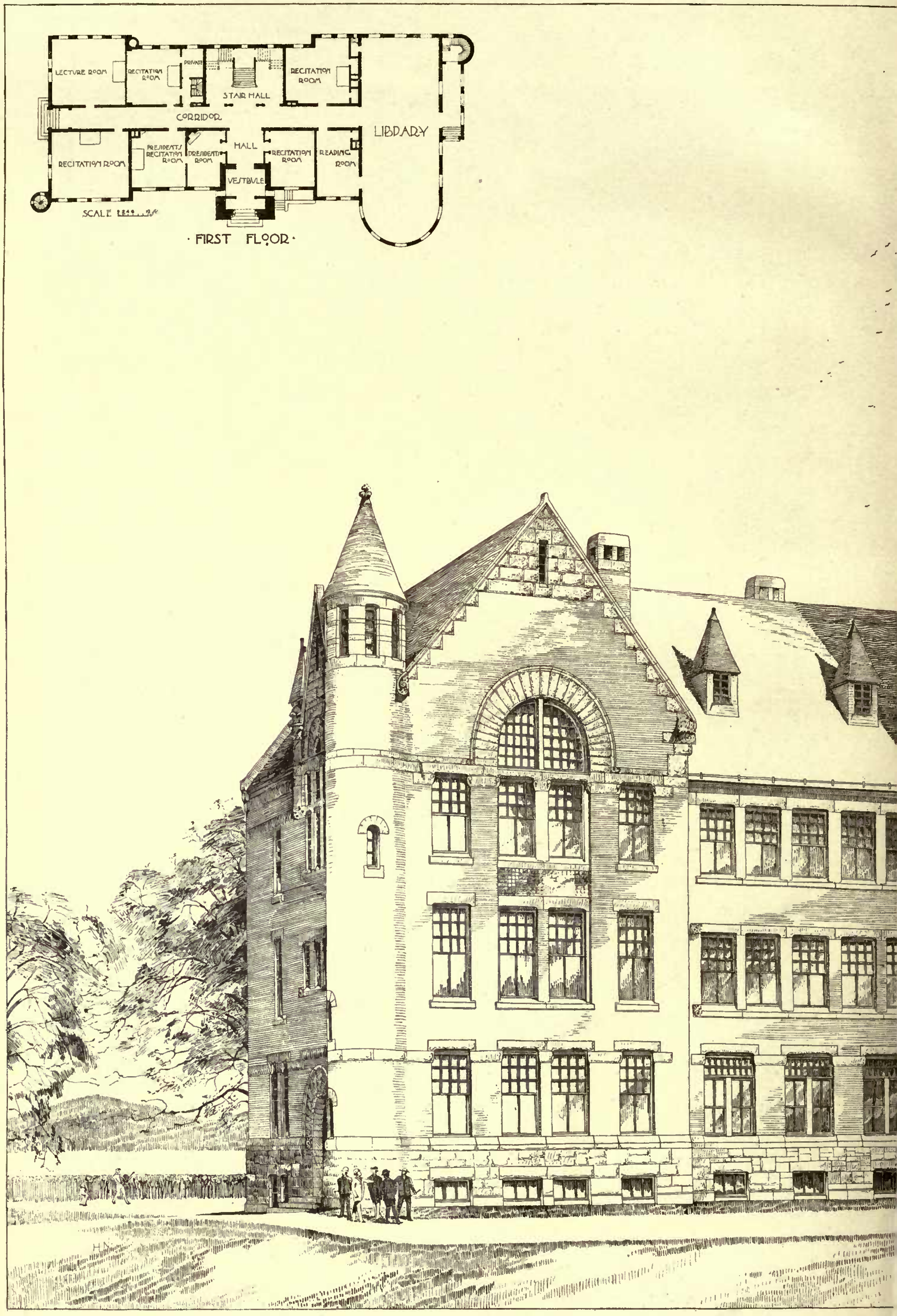


Heliotype Printing Co. Boston

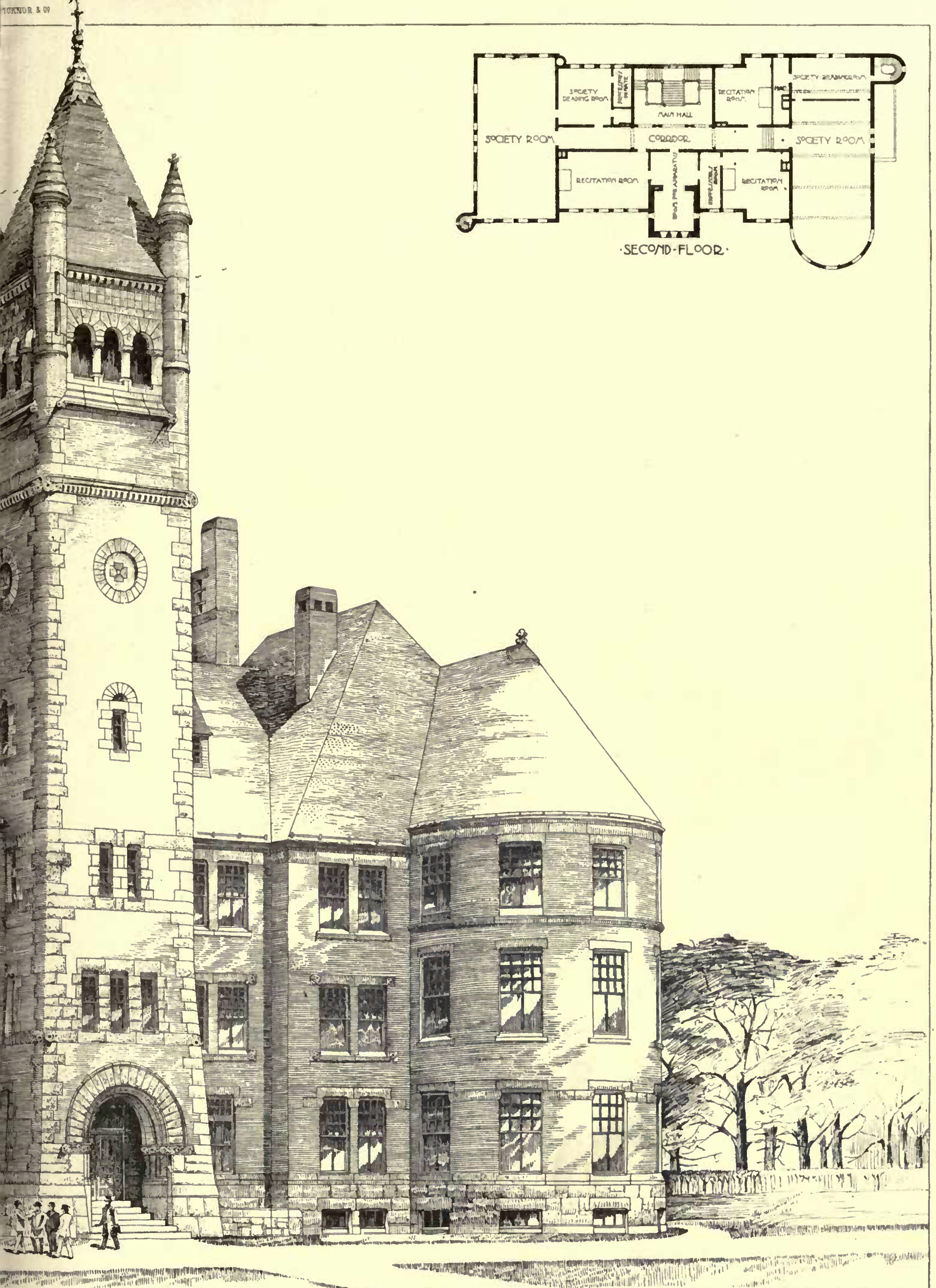
COPYRIGHT 1888 BY TICKNOR & Co

"Pro Patria"

COPYRIGH


LECTURE ROOM
RECITATION ROOM
PRIVATE
STAIR HALL
RECITATION ROOM
CORRIDOR
LIBRARY
HALL
RECITATION ROOM
PRESIDENTS RECITATION ROOM
PRESIDENTS ROOM
VESTIBULE
RECITATION ROOM
READING ROOM
SCALE
· FIRST FLOOR ·
H.N.

Ticknor & Co



BUILDING FOR PENNSYLVANIA COLLEGE; GETTYSBURG, PA.

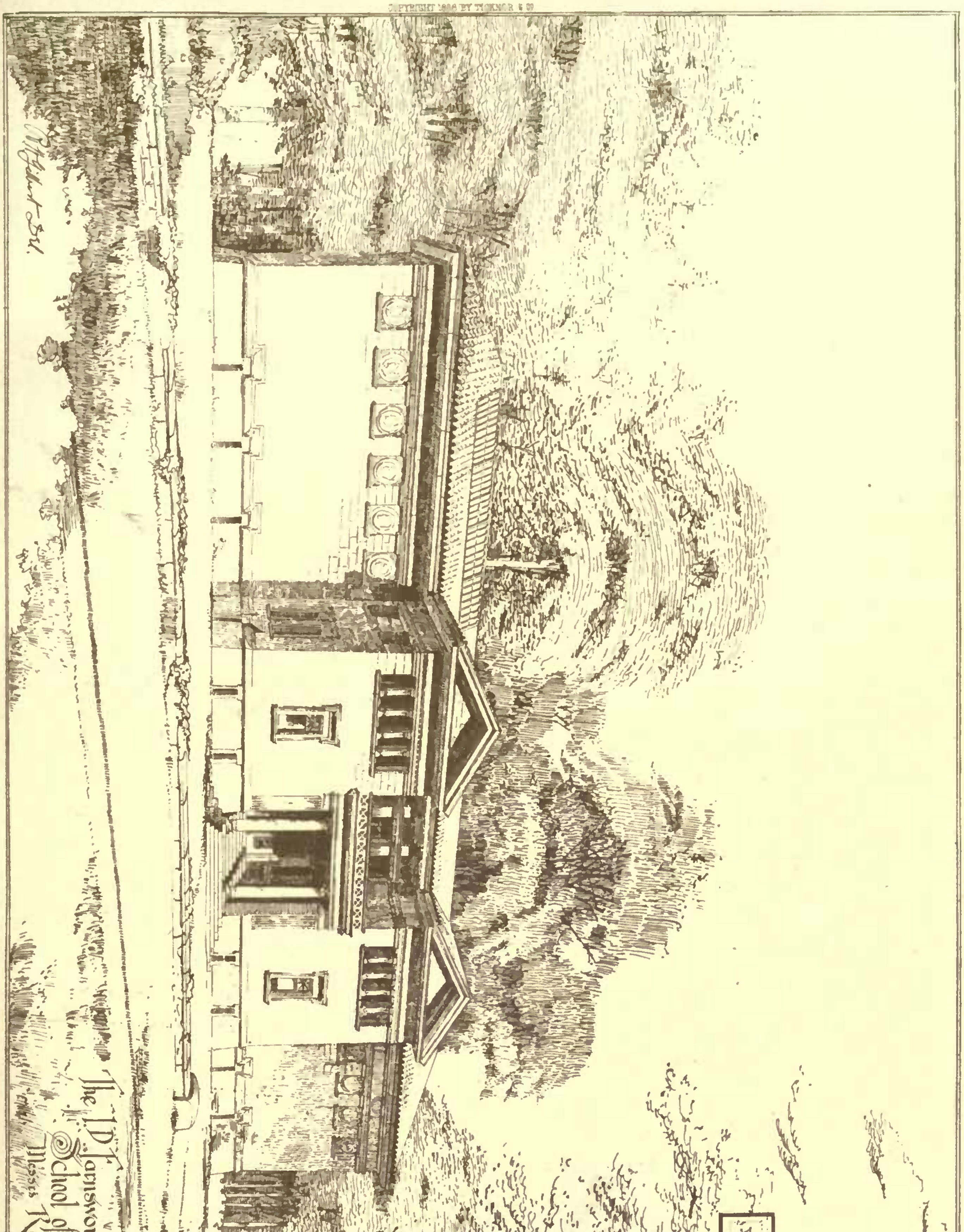
J. A. DEMPWOLF ARCH'T. YORK, PA.

Heliotype Printing Co. Boston

COPYRIGHT 1888 BY TICKNOR & CO

Heliotype Printing Co. Boston.

COPYRIGHT 1888 BY TICKNOR & CO



Heliotype Printing Co. Boston.

was held at their rooms at Conduit Street, last Thursday week, to enable the Institute as a corporate body to petition against the bill, and was very well attended. Mr. A. W. Blomfield, M. A., the recently elected A. R. A., was in the chair, and it was soon apparent that he would be no fancy chairman. What he said was law. "The question before us, in effect," laid down by the Chairman, "is whether we shall or shall not petition against this bill, and nothing else is in order, nor shall I permit it to be said." Neither did he. Thus handicapped, the expected discussion upon the abstract question of registration could not take place, and the interest was confined to the voting. There were seventy-five Fellows present, and all but three voted in favor of the proposed petition. These three were Mr. Blomfield, the Chairman, Mr. White, the Secretary, both of whom were prevented by their official positions from voting, and Mr. Gough, the registrationist leader. Comment is needless. It must, however, be remembered that under the existing régime, Associates are not permitted to vote at these meetings, and the Fellows consist almost entirely of men fairly advanced in years, who, being quite inured to the present state of affairs, naturally look with suspicion upon any attempt to disturb it.

The opposition organized by the three Institutes appears to be of a very complete character, and it seems quite impossible that a bill of the character of that now before Parliament can pass in the face of such opposition. I hear from a trustworthy source that the cause of the Royal Institute of British Architects will be advocated by a very eminent conservative M. P., Mr. Chaplin, and that of the Surveyors will be represented by their President, Mr. Beadel, M. P. The Engineers are treating the matter in a very contemptuous manner, as if it were hardly worth their serious attention.

On the other hand there has been quite a flood of petitions in favor of the bill presented to the House of Commons from all parts of the British Isles, and several provincial societies have subscribed to the fund for producing the necessary expenses, incident on its passage through the House, including such admittedly orthodox societies as the Sheffield Society of Architects, and the Leeds and Yorkshire Architectural Society, although the president of the former has publicly expressed his disapproval of the course of action taken by his society. The press, too, is carrying on the war of words with unabated vigor, and, indeed, it is a matter of regret that the leading journals on both sides do not modify the acrid tone of debate that they have seen fit to adopt.

These few words will serve to show the intense interest which this matter is exciting on this side of the Atlantic just now, and it will be somewhat of a relief to many steady-going and quiet individuals when the fate of the bill is decided and the political thermometer of English architecture returns to its normal condition.[1]

The Royal Commission upon the Metropolitan Board of Works has now been appointed and consists of only three members — Lord Herschell, the Lord Chancellor of Mr. Gladstone's late Administration, Mr. Bosanquet, Q. C., and Mr. Grenfell, a Director of the Bank of England; so it seems that the Government by appointing an eminent lawyer and financier intends to make this inquiry a strictly business one. It is to be hoped that the rumors one is continually hearing in the city are *only* rumors, otherwise the result will be very uncomfortable for a certain architect, an Alderman of the City of London, whose name is persistently coupled with these rumors. No doubt you have heard that apart from these recent scandals, the Metropolitan Board of Works is doomed, for the new Local Government Bill, lately introduced by the Government, contains a clause providing that London shall be governed by a "County Board," which is to supersede the Metropolitan Board of Works in the administration of metropolitan affairs. The universal satisfaction with which this provision has been received can hardly be called complimentary to the present members.

The papers read before the learned societies of late are not of surpassing interest. At the Royal Institute of British Architects the other night, some interesting memoirs of the late Mr. Beresford Hope were read, and Mr. Weathered contributed an interesting account of "A Fortnight in Switzerland with M. Viollet-le-Duc." At the Architectural Association, Mr. F. M. Simpson has read a paper upon the pregnant subject of "Old Housework," which, though treated very well, might have been made more of; and Professor Unwin, of the City and Guilds of London Technical Institute, gave us quite a college lecture upon Hydraulics, which he illustrated by some very beautiful experiments.

Two examinations in architecture have recently been held by the Royal Institute of British Architects at Manchester and at London, and have been eminently successful, nearly fifty candidates in all having passed, including several from the colonies and India. This examination seems rapidly taking its proper position as the recognized final examination in our profession, after passing which a man may fairly claim to call himself an architect. It hardly seems yet, however, to have quite found its level, and a leading article appears this month in the official organ of the Architectural Association strongly advocating its conversion into an examination for a professional degree. Thus you see, events seem steadily tending in the direction of a collegiate course for architects, and there is very little doubt but that it will eventually come to this.

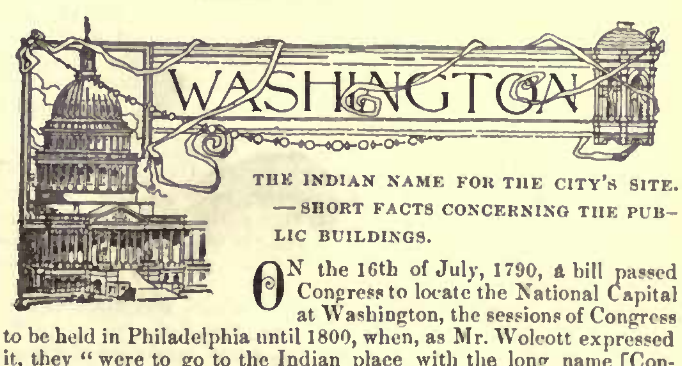
I regret extremely to have to state that Professor Kerr, the popular professor of architecture at King's College, perhaps the most eloquent man in the architectural profession, is suffering from cataract, and will shortly, I hear, have to undergo an operation. I am sure the sympathies of American architects are with him in his trouble.

The visits of the Architectural Association this year, though not to buildings of any paramount importance, have yet been of considerable interest. They have included the new hall of the Cutlers' Company which was recently dispossessed of its old hall by the completion of the Inner Circle Railway. The architect has evidently put a lot of feeling into the work, and though some of the detail is bold — almost coarse — yet the internal effect of some of the rooms is good. The walls are treated with oak (merely washed, by the way, with ammonia and not smoked) and Japanese leather papers. A curious effect has been obtained in the large hall by the employment of double principals and in lieu of the ordinary arrangement. The Great Northern Central Hospital, also visited, is only partly finished, and I hear the architects, Messrs. Young & Hall, are going to try the, I believe, novel experiment in England of a circular-ward. As Mr. Saxon Snell and other great hospital authorities have declared against this circular form of hospital ward, it will be curious to see the result of Messrs. Young & Hall's experiment. A West end club-house, some large residental flats, and a new church near St. Mary Abbot's, Kensington, have also been visited by the Architectural Association.

In the art-world, the split at the Grosvenor seems still to attract attention. A short time ago a complimentary banquet was given to Sir Coutts Lindsay by the Committee of the Grosvenor Gallery. Amongst those assembled were Mr. F. Goodall, R. A., Mr. Frank Hall, R. A., Mr. G. H. Boughton, R. A., Mr. E. J. Gregory, A. R. A., Mr. P. R. Morris, A. R. A., Mr. Henry Moore, A. R. A., Mr. J. W. Waterhouse, A. R. A., and many other eminent artists, in addition to several peers and patrons of art. Thus it seems that the ostentatious departure of Messrs. Hallé and Comyns Carr and their friends has not bereft Sir Coutts of all his supporters. Talking of this, a capital "Queer Story" appeared in *Truth*, evidently upon this subject, in which Mr. Grenville Murray's covert satire was more than usually brilliant. There seems, however, to be a considerable amount of energy on the part of these schismatics. Their new gallery is situated in the centre of Regent Street, and the open door nightly shows forth to the world a busily engaged gang of workmen preparing the gallery for the forthcoming exhibition which is going to astonish the world. Whether it will or not, *nous verrons*.

I was present at the private view of a charming collection of pencil and water-color sketches of Oxford at the Fine Art Society's Galleries. They are the productions of Mr. J. Fulleylove, R. I., and are exceedingly interesting. I suppose there is no city in the world so full of interest to the architect as Oxford, and Mr. Fulleylove has worthily represented its beauties. Of course, we miss that appreciation of detail that we are accustomed to look for in our professional sketches; yet, I doubt whether it is not rather a relief at times to turn from our somewhat formal productions to such delightful sketches as Mr. Fulleylove's. All parts of Oxford are represented, and the quaint nooks and corners to be found in the by-ways have not been neglected. Magdalen — queenly Magdalen — occupies deservedly the first place, for no less than eleven out of the eighty-eight drawings on view are representations of its beauties. Christ Church has also received its full share of attention, as has also Merton. There are three views of the "High," with the spires of All Saints' and St. Mary's. The beautiful dome of the Radcliffe Library forms the subject of more than one sketch, and the charming view of Oxford, as seen from Headington Hill, has been portrayed in a masterly manner, and though Mr. Fulleylove has mainly confined himself to architecture, yet his artist propensities creep out in various charming little sketches on the river and in the gardens of New and Magdalen. Altogether the exhibition deservedly earns the appellation of unique, for not since Turner's time has so complete a collection of drawings of Oxford been exhibited.

CHIEL.



THE INDIAN NAME FOR THE CITY'S SITE. — SHORT FACTS CONCERNING THE PUBLIC BUILDINGS.

ON the 16th of July, 1790, a bill passed Congress to locate the National Capital at Washington, the sessions of Congress to be held in Philadelphia until 1800, when, as Mr. Wolcott expressed it, they "were to go to the Indian place with the long name [Connogocheague]." Many doggerel verses were written in opposition to the present location. One from Philadelphia says: "Since you writ us Congress and court have determined to quit us.

> "In fact, he would rather saw timber and dig
> Than see them removing to Connogocheague,
>
> . . . .
>
> Where the houses and kitchens are yet be framed,
> The trees to be felled and the streets to be named."

---

[1] Since this matter was put in type we have received a cable message that the bill was discussed on April 17 and withdrawn. — EDS.

The ground was originally owned by some seven or eight families, as the Burnses, the Youngs, the Carrolls, the Davidsons, the Blodgetts, the Peterses and Walters. The original proprietors conveyed the whole to the United States on consideration that when it was surveyed and laid off the original proprietors should retain each alternate lot; such land as was retained by the Government, exclusive of streets and alleys, was to be paid for at the rate of $121.50 per acre. The first Commissioners were Johnson, Stuart and Carroll. It was first called the Federal City. In a letter of the commissioners of the date September 9, 1791, to Major L'Enfant, who was addressed under the title of "the architect," they say that they had agreed to call the Federal city "the City of Washington" and the Federal district the "Territory of Columbia."

Dr. William Thornton, who was the successful competitor for the United States Capitol, was afterwards appointed in 1794 one of the commissioners to survey and lay out the city.

Major L'Enfant has the credit of planning the city, and from 1800 to 1860 his plan was ridiculed for its grandeur, Dickens, Thackeray and other authors taking occasion to poke fun at the "city of magnificent distances" without pavements or houses. There are many curious letters on record from politicians, foreign visitors and their wives in relation to the inconveniences which they had to undergo in their lodgings, conveyance and walking, which I would be tempted to quote if space allowed it. But now all, both citizens and foreigners, give the engineer credit for proper foresight in laying out the Federal city on its present plan.

As late as 1861–62, it is said that teams would become stalled in the mud on Pennsylvania Avenue. From 1871 to 1875, hundreds of miles of wooden pavements were laid under "Boss" Shepherd, and answered their purpose for a year or two, when they began to decay. They have all been taken up and the streets are now paved with concrete and asphalt for light vehicles and granite Belgian blocks for heavy traffic, so that Washington can boast now of having the best paved streets in the world.

For the first forty years the population increased at the rate of only five hundred and fifty per year, and in 1860 the population was about sixty thousand. The last directory shows a population of two hundred and fifty thousand. For years the Government buildings were the only architectural attraction in the city. The corner-stone of the Capitol was laid September 18, 1793, by George Washington, with Masonic ceremonials by the Alexandria Washington Lodge of which he was Worshipful Master. In 1800, the Capitol and President's house were partially completed. Mrs. John Adams says, in reference to the White House: "The house is made habitable, but there is not a single apartment finished, and all within side, except the plastering, has been done since B. came. We have not the least fence, yard, or convenience without, and the great unfurnished audience-room [East Room] I make a drying-room of to hang up the clothes in." The Patent-Office, Treasury and Post-Office and the wings and dome of the Capitol were completed just before or during the war.

Mr. Thomas U. Walter's, the late lamented president of the American Institute of Architects, connection with the extension or completion of these buildings is interesting, he having a claim pending for professional services rendered on them. In 1851 he was commissioned by Fillmore to take charge of the Capitol extension (the wings), the amount of the work being fixed by Act of Congress, and the salary for this special work being fixed in the same act. In 1851 he was commissioned by Secretary A. H. H. Stuart to take charge of the wings of the Patent-Office. In 1852 he took charge of repairs and additions to the Congressional Library. In 1855 his plan for the extension of the Treasury and Post-Office and dome of the Capitol, and the superintendence of the same were confided to him by Act of Congress. Mr. Walter laid a claim for these services. According to affidavits, he not only expected additional pay, but the officials expected him to receive such remuneration. Equitably, of course, this claim should be adjusted and paid, as the salary was a contract morally, and, I should think, legally, taking the letters of Mr. Stuart and President Fillmore into consideration. Mr. Walter's work is by far the best from an architectural standpoint of the government buildings erected in this city, all details and groupings being strictly Classical. There is a quietude, massiveness and dignity in their design which is sadly lacking in some of the more modern Government buildings.

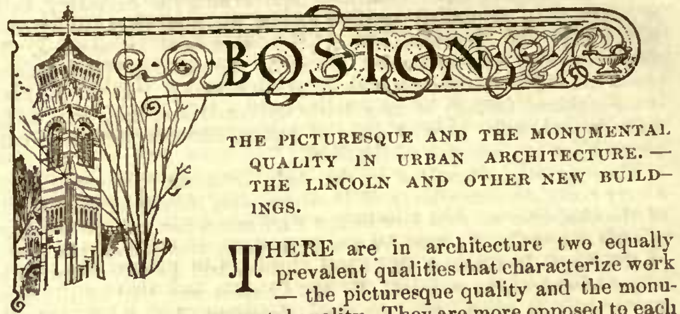
The National Museum, completed two or three years ago, is unfortunate in the design — strikingly so when viewed in connection with the Smithsonian, its next door neighbor, but excellently adapted inside for its purpose, being as far superior to the Smithsonian in this respect as the Smithsonian is superior to it in design. The Bureau of Engraving and Printing is on the other hand an example of a well-designed brick building.

The War, State and Navy Departments were completed in January last, having been in process of erection some ten or twelve years. It is a large and costly building, a poor treatment of French Renaissance. When viewed from the avenue (the principal point of view), it is down in a hollow and looks low. It is one mass of small windows and small porticos, each designed apparently to accentuate its smallness, making the building appear a pile of small details conspicuously obtruded. In this way a quiet, massive and dignified effect, so important for a large Government building, is lost, and yet it cost about fifteen million dollars!

The Pension-Office, the Medical-Museum and the Washington Monument are the other Government buildings which have been completed in the last year.

The Pension-office shows that an architect, not an engineer, should be selected to design a building, even if engineers are selected to superintend its structure. The building is an effort to introduce the exterior of an Italian palace into a Government building. The effect is not happy.

The Government buildings in process of erection are the Congressional Library, the Soldier's Home, remodelling the terrace of the Capitol, each of which I will treat separately in some future letter.



THE PICTURESQUE AND THE MONUMENTAL QUALITY IN URBAN ARCHITECTURE. — THE LINCOLN AND OTHER NEW BUILDINGS.

THERE are in architecture two equally prevalent qualities that characterize work — the picturesque quality and the monumental quality. They are more opposed to each other than is at first apparent, and symbolize not only the expression of different types of mind and kinds of education, but they vary with physical surroundings, and especially with social and public progress. One pertains to the romantic attitude of mind, the other, one might almost say, to the forensic. Monumental work certainly has forensic qualities, inasmuch as there is a desire to impress by dignity, by grandeur, in fact by eloquence as compared with the more emotional contrasts of picturesque work or language. The choice of either of these qualities as the dominant note of a design rests solely with the architect. The exact equilibrium of both in the same building is well-nigh impossible, for while, on the one hand, picturesqueness often courts monumental detail as a restraining factor, a monumental design destroys its own existence the moment it tolerates a suggestion of picturesqueness.

The picturesque design, as its name implies, depends for its attractiveness on accidentals — studied and elaborated and artificial accidentals, perhaps, but none the less accidentals — in so far as light and shade and perspective groupings are concerned. It relies upon the variety and vivacity of rapidly changing effects from different points of view; on sharp contrasts, and the piquancy of small detached masses; on quick transitions of form, color and material. It seldom inspires homage, but often compels applause. It is not a thing before which to be silent, but rather excites the "ohs!!" and "ahs!!" which denote a pleasing but not too subtile titillation of the senses. On the other hand, monumental work has, above everything, two noble virtues, simplicity of form and arrangement and majesty of scale; without these it does not deserve its name, it becomes a formal, petty thing, devoid of merit.

Neither of these great virtues can be expressed on paper, except to the eye that has been trained to feel scale in drawings, and can mentally evolve the meaning of the bald data of elevations.

The impressiveness of size as compared with the size of man cannot be compressed within a sheet of Whatman. Nor can the noble simplicity of a single great form be expressed by the hair lines of a writing pen and the graded shadows of windows. The means of expression are unworthy of the thing expressed.

But with picturesqueness it is different. Sketching enhances its most attractive side; the accidentals of the pen-and-brush-work are only added to the accidentals of the design, and as scale is not an element of the work to any great degree, all its other qualities can be expressed and flattered to any size whatever. It is this specious lying, charlatan quality of the sketches of picturesque work that catches and holds the attention of the layman, which pleases him and which is the reason for his disappointment when the actual work is completed. Is there a latent suggestion in this? Great robes belong not to the little, nor do small coats fit large men. When such qualities as impressiveness and dignity exist no work can be too great to require them, while staccato contrasts belong by mere necessity to small forms and subjects. Therefore the greater the work in purpose and in size the more it needs the great qualities of monumental work, and the smaller the work in purpose, in size, in material and in physical surroundings, the more it will need the vivaciousness of the picturesque to make it capable of attracting consideration. And to carry the thought still farther, and really to the point of the whole matter, going beyond the actual building to the conditions that have produced it, it can safely be said that the greater the mere numerical importance of the city that erects buildings, the greater will be the tendency towards monumental work, and how much more so if associated with mere numbers is a corresponding advance of breadth of view, of largeness of idea, and of simplicity and nobility of life. So long as a city is provincial its character will be picturesque rather than impressive; but the varied charm once lost by growth the monumental quality is the only thing that will bring repose.

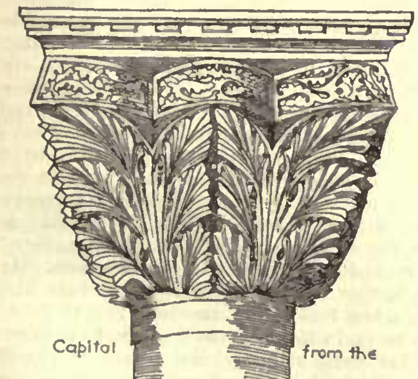
Glance at the cities of Europe: the picturesque cities with picturesque buildings are the small cities — Chester, Shrewsbury,

York, Rouen, Tours, Troyes, Lubeck, Nuremberg, Heidelberg, Regensburg, Verona, Lucca, Siena, Perugia, Burgos, Avila, Seville. The cities with long monumental façades with simple sky-lines, with great squares and long avenues and vistas, with fountains and statues, are the great cities: London, Paris, Berlin, Dresden, Munich, Vienna, Rome, Madrid. It is not a fashion for Classicism. It is because large requirements cannot be made to conform to the eccentricities of the romantic treatment, and because the lights and shades of Nature in sunlight and shade need no further frittering with all sorts of little shadows. In the past our cities have been small, and naturally we have been through the picturesque stage, only we are still in our short clothes, though we are full-grown boys, simply because we have grown too rapidly and there were few good tailors. We have that excuse no longer. Boston is growing in all directions. With a little thought now there would be good prospect of its becoming a city with buildings and spaces worthy of it. The Charles River embankment is one step in the right direction. The Public Library is to be another, and a very great one. Commonwealth Avenue, as far as the street is concerned, though not in the houses upon it, is still another, and within the past year several simple buildings have been going up. Of these, the most disappointing, with the possibilities at hand, is the long façade on Lincoln Street, near Essex. The scheme is simple and good. A store story, a heavy string-course, moulded and projecting too much, the remaining stories above within a high great arcade, with pilaster treatment between the arches; a rather meagre cornice, and above it, in the centre of the building only, a top story surmounted by a balustraded parapet. The pilasters, cornice and strings are of cut-stone; everything else is rough-face. The contrast between the cut-stone pilasters and the rock-face wall, against which they stand, is most disagreeable. Rock-face work will not allow cut-work to be used near it except in jambs, soffits and strings without the cut work losing largely by the contrast. The richness of light and shade in rock-face walls kills the value of smooth surfaces, and they should only be used above it and not in the midst of it. Mouldings with rich shadows, fully detached columns and forms with much light and shade can alone hold their place among rock-face work. The fluting of the pilasters is not good. Fluting in which the arris is more than, at greatest, one-eighth of the width of the flute is always unsatisfactory. Consoles set up on end and flanking the base of the chimney are very feeble motives. The reveals are inadequate for the size of the arcade. The chance was an exceptional one. The result is disappointing.

The Boylston Building, on the contrary, improves. It is dignified, and has the impressiveness of size and simplicity. The Ghibbelline swallow-tailed parapets seem unnecessary, and a fuller upper cornice would have made a better termination to the building, but, with this exception, and that of the lettering, the building is most satisfactory.

On Washington Street, near the Boston Theatre, there is an example of the complete subversion to the desire for novelty that so often destroys our best work. It is a store front of brick and stone, is simple and good in detail; but the windows, which are in three pairs across the front, crepitate outwards into two-sided flat bays the full height of the building. These bays cannot project more than eighteen inches, if they do that. The additional light and view gained must be very slight, and not worth the trouble, and, to make it worse, there are stone quoins at the outer angle, to obviate cutting the brick, perhaps, and this gives a heavy stone mass in the centre of the bays, not flanking them, from top to bottom. The whole thing is so manifestly the momentary affectation that has crept into work that is otherwise good that one wishes for some force that would press these windows that seem to buckle out from the wall back to a flat surface.

THE ART OF HOUSE-BUILDING.[1] — II.



Capitol from the Fondoco del Turchi, Venice. after L'ART.

It is not my fault that at the commencement of this study it is said that the Gallic dwelling which is treated in the book of M. Boussard could only be in fact the Roman house. In truth, when the author wishes to trace the ideal type it is to Pompeii that he goes in search of it. This gives him the chance of taking for his guide M. de Lagrèze, and who, amongst French writers who have studied that ancient Roman city, is the one who has done so most competently and with the best show of reason. An excursion through the streets of this great city, buried beneath the cinders, which, like the phœnix of the fable, has been born again, does not lack charm or interest. One would think it a sleeping city, and, under the desolate aspect of its ruins, one would feel that he might soon be present at its arousing. A cataclysm surprised it in full life. The track of the last chariot which rattled over the pavements is still visible; fountains and triumphal arches are still standing in part. In one bakery was found bread bearing the date of the 23d of November of the year 79. Farther on, we can examine a workshop where the tools still remain intact. The *ergastulum* (the private prison) offers us the distant image of the captive slave. The luxury of the apartment, the accessories of the dressing-room, the couches of the triclinium, show us that in certain ways the epicurians who dwelt upon the Neapolitan shores knew more than we do of the elegancies of coquettishness. After a little search we might discover the remains of a repast interrupted by the catastrophe, and of which a learned archæologist would not have much difficulty in reproducing the *menu*. The walls of the houses and public edifices, tombstones and the "album of the streets" are scribbled over with verses from Ovid and Virgil. To these Classic quotations are added anonymous epigrams. Somebody writes: "I loved a blonde and she has disgusted me with all blondes." Venus Physica replies: "Thou detesteth the blonde, but in spite of thyself she shall return to thee. It is I who assures thee of this." This gives us reason for believing that Venus Physica was not a blonde.

We could not finish if we were willing, in company with M. Lagrèze, to pass in review all the collections of the houses, all the utensils of housekeeping and the toilet, whose manufacture reveals an exquisite taste; the candelabra, the weights of the balance, everything, is moulded, carved, sculptured and incrusted. Surprises of another kind await us if we are willing to delve in other corners of this necropolis, and many inventions of which we claim the merit would turn out to be very familiar to the ancients. Has there not been found, for example, at Tarquinia in the Etruscan cemetery a skull furnished with false teeth, filled with gold fillings and manufactured with such perfection that modern science could not surpass it?

Now for a description of the Gallic house such as M. Boussard imagines it. The entrance-door is in the first place protected by a portico, under which the visitor finds at need a shelter while he rings the bell. I borrow, almost word for word, his description, in order that I may not take the spirit out of his ideal. In the first place, we enter a long, narrow room, upon one side of which opens the lodge of the porter and on the other the cloak-room, where, if we wish, we may leave our hats and coats and enter the *salon*. M. Boussard even says that we may leave there our umbrellas, but it is not very certain that the Romans or the Gauls had knowledge of this article, which to me seems rather a product of the civilization of our times.

Next, the first *salon*, which is lighted by a fine glass window, which fills the middle of the ceiling and which can be opened when the weather is fair for the admission of air and sunshine. The decoration, composed of beautiful and bright-colored portières and woodwork finely carved, is made complete by a fountain whose crystalline jets fall back into a marble basin. The tones of the mural paintings, the tile-work, the crystal mirrors framed in polished metal, as well as bronzes and wrought seats, stand out with much life against the green of the plants and velvety foliage and the many-colored flowers, which add to the scene a restful freshness. Here it is that the master of the house will come to meet us.

Learning that it is our desire to examine the arrangement of his house, he does the honors of it with charming cordiality, knowing that he has to deal with artists. He first shows at the right and left guest-chambers, for which the atrium serves as the common *salon*. Then he lifts the portière in front which closes the entrance into the museum where are preserved portraits of his ancestors, their arms and busts in bronze, fine pieces of jewelry, everything, in short, which goes to form the collection of those objects which have formed part of the lives of the departed and speak as much to the heart as to the eye. At each extremity the house-gods, protectors of the house, rear themselves on their pedestals and receive the homage of the passing visitor.

Return now to the atrium and follow along to the right a long corridor which leads us to the kitchen and its dependencies, where the elegance of the pots and pans, the studied forms of the cooking utensils, are really surprising; and symmetrically on the left are the stables and coach-houses, where horses and carriages are not less luxuriously and sumptuously installed. Special doors for both of these departments open on a passage at the right and left of the principal doorway. Shops are arranged on either side for letting or for the sale of the products of the owner's farm.

Returning a second time to the atrium, which is, let us not forget, the centre of the public life of the house, we penetrate to the private portion of the house through two passages situated on either side of the museum and which give access to it under a gallery or rectangular peristyle ornamented with columns and closed by glass windows, and in the centre of which is a charming garden decorated with fountains, statues and exedras, forming the axis about which are arranged the reception-rooms, the library and work-room, several dining-rooms, a little gymnasium, a hall for fencing, and finally, a complete bath, arranged with its three regulation-rooms, including the steaming-bath and the douche. Finally, on the right, we arrive at the end where a last door opens under a portico and gives us entrance to the gynecæum. Here transpires the private life of the household. In these dwelling-rooms are other rooms arranged about a small atrium highly decorated, which has a private entrance used

[1] "*L' Art de batir sa Maison*" Librairie des Imprimeries réunies, Paris. Continued from No. 642, page 167.

only by the householder and which puts him in communication with the street in the rear.

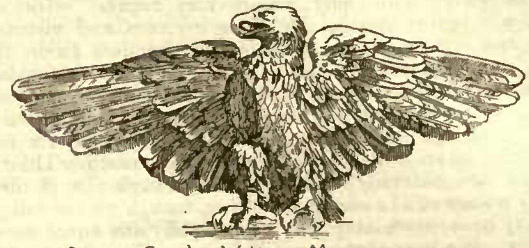
This house differs essentially from the modern house, whose history M. Boussard draws for us. On the morrow of the invasion of the Gauls the new society separated itself, as it always does, into three classes — priests, the wealthy leaders and the working people. Each of these three classes built for itself dwellings of different type. The priests built their convents, the lords their castles, and the people their huts. This treble grouping still exists in our cities. In the country the vicissitudes of construction were the same. The rudimentary type of rural dwelling-house remains in the charcoal-burner's hut, with its clumsy carpentry and its masonry of beaten earth, pierced at the summit by a hole through which the smoke escapes. In the hamlet we encounter the little square thatch-roofed house with its gables, which contains a single room and connects through a low doorway with a neighboring stable. Apart from the difference of proportion the analogy of construction is perfect between this little house and the hut of the charcoal-burner. When the peasant grows richer he enlarges this dwelling, but without altering its interior arrangement. He enlarges it and raises it so as to form that dwelling which we all know, and which may be described as follows: A square house whose principal door opens on an entry which serves two rooms on the right and left, with a staircase at the back leading to the first story. Rarely has the modern French architect thought to repudiate this architectural theme; and the prettiest little villages with which the French country is sown have for their starting-points the hut of the charcoal-burner, that is to say, the hut which the uncivilized man has built. It is time that a revolution should take place, and that our civic life should return to the traditions of antiquity, applying to them the resources and discoveries of modern science.

The plan of this model house, classic in its amplitude and grace of proportions, the ordonnace of its rooms and the distribution of ornamental parts, modernized in revenge by wise adaptation of the new conquests of arts and science — this plan, I say, is very sagely developed by the author. In front is an enclosed paved court of wrought-stone, and of which two raised walks complete the decoration. One can in this way pass from the house without stepping immediately onto bare ground. Children can take here their recreation when rainy weather banishes them from the garden. Finally, it opens onto the porch, under which opens the house-door. It is useless here to dilate on the usefulness of the porch. The door allows us to penetrate into a little vestibule, beyond which is found a closed court, ornamented with porticos, rare plants, mosaics, hangings, marbles and paintings. It is covered in the centre by a movable sash, and the floor beneath it is slightly hollowed so as to receive the few drops of rain that a sudden storm might blow in before the sash could be closed. A little vase of marble ornaments the centre of the basin, and the tinkling of its jet of water enlivens and refreshes the place. In front three large doorways conduct the visitor to the living-room. Large bays arranged on the circular plan give to this room the aspect of a covered exedra, whence the view stretches out over the landscape, the house being placed on a hillside. This living-room, adjoining the study of the head of the house, serves as the headquarters of the mistress, for from this central point oversight is more easy and more immediate. From this room can be entered the dining-room, which is separated from the kitchen by pantries with double doors, which render the domestic service independent of the central court. The linen-closet and the chambers of the servants are annexed to the kitchen, which also communicates directly with the cellar. Returning to the *salon* by the central court, we can, through the left-hand door, enter the sleeping-room of the master. This chamber, the *salon* and the dining-room, are the principal rooms of the house, and consequently have an outlook upon the fields, the landscape and the distant views. In a room next to the sleeping-rooms are installed the hydropathic arrangements, the bath-rooms, the douche, the hip-baths and the vapor-bath. Finally, under the portico of the court open two more sleeping chambers and wardrobes, with double doors opening on the vestibule, and the water-closets. Thus disposed and arranged, says the author, a dwelling-house contains a sufficient number of rooms for a family of ordinary size. The furnishing can be very economical. everything allowing the court and its porticos to be in some way turned into a sort of little museum, where the family souvenirs can find a resting-place, an annex, as it were, to the *salon*, and forming for it a prolongation for the fête days. The *salon* can equally be transformed on occasion into a ball-room or a dining-room, if one has had the forethought to regulate the height of the fountain so as to have it serve as a central support for the dining-table.

The orientation of the house is a matter of prime importance. The neighborhood of damp-grounds which at night, especially in the autumn, are covered with mists, is very dangerous, for it predisposes to rheumatism, catarrhal affections and consumption. Elevated sites are preferable, summits being the most healthful because of the continual change of air, but the violence of the winds usually makes them very uncomfortable places. One must rather seek a site half way up the hill, in a position open to the currents of air. It is generally preferable that the house should face either east or west; if to the north, the air is too dry; if to the south, the dampness due to evaporation is not without danger. H. MEREU.

[To be continued.]

JAPANESE PICTURES.



Roman Eagle—Vatican Museum—after Raguenet.

ALTHOUGH it is difficult to endorse the report of the Japanese Commission upon the future of art, yet the collection at the British Museum proves once more that Japan possesses work, which from its own particular standpoint, equals any school of European painting. The art of Japan seems to have been the outcome of that of China; and the oldest written documents of the Japanese, those of the eighth and ninth centuries, make no allusion to any style of pictorial art previous to the fifth century. The first painter mentioned was a Chinese, one Shinki, who is said to have come to Japan during the reign of the Emperor Yūriaku (457–479). The fifth in succession from Shinki, or Nauriū as he is sometimes called, obtained the title of "painter of Japan" from the Mikado; and the Empress Shōtoku conferred the name of Ōoka-no-Imiki upon him in 1770. Kauaoka became famous about 850–859, and although none of his works remain, the references to them are so precise, that there is no reason to doubt his great talent. The collection opens with specimens of what is called the Renaissance of the fifteenth century; but if the visitor expects to find a decided demarcation between early and late work, between primitive and revival schools, as in Italian art, he will be grievously disappointed. All Japanese pictures are essentially decorative; there is not the faintest attempt to depict one object behind another, light and shade are unknown qualities, and linear perspective is, of course, completely ignored. This is very strange, for one cannot conceive such close observers as the Chinese and Japanese being unable to see, for instance, that a road appears to diminish as it recedes from the eye. Why is this? That intricate laws of perspective want study, that even the vanishing lines of two sides of a house may not be perceptible to the ignorant may be possible, but the merest child sees that a road is narrower at the end than at the beginning where he stands. Then, again, although the anatomy of each bird, beast and fish is as closely observed as to its general characteristics, distance is only indicated by diminishing the objects depicted; and the armor and each detail of the costumes of the soldiers a mile off, are painted with as much minuteness as that on the men who are in the immediate foreground. But for dexterity of touch, for brilliant coloring, for real impressionism of the truest kind, what artists can equal the Japanese? A great man, according to a native authority, was Sesshiū, who died in 1507. "He did not follow in the footsteps of the ancients, but developed a style peculiar to himself. His power was greatest in landscape, after which he excelled most in figures, then in flowers and birds; and he was also skilful in the delineation of oxen, horses, dragons and tigers. In drawing figures and animals he completed his sketch with a single stroke of the brush, and of this style of working he is considered the originator." And we, 350 years later, pride ourselves upon the invention of impressionism and set up Manet as our high-priest! It is difficult in looking at Sesshiū's work to see in what way he invented a new style, and to understand the boast that he studied nature in his landscapes. If he be right, we and our Turners, our Constables, our Claudes, are lamentably wrong; and we may ask ourselves whether we ought not simply to *suggest* effects, to ignore sunlight and shadow, and to cease to try to represent nature as we are in the habit of doing. "The Hundred Cranes" is an example of those birds in every imaginable position — flying, poised on the air, standing, eating, swimming — and all faultlessly drawn. So also is its neighbor, a flying-squirrel. The "Philosopher and his Disciples" is an example of most perfect flesh-painting "after its kind," which for modelling reminds one of Holbein: there is all the apparent flatness, the want of strong effects of light and shade, and the intense individuality of expression and precision of drawing. It reminded me of some of Bastien-Lepage's portraits also — but, he, too, was avowedly a disciple of Holbein. Strange is it, that with all this perfection of drawing of the heads, the rest of the figures are formless and unfinished. Another most remarkable picture is a "Ghost" floating up out of space, the head, hair and shoulders, minutely painted; but the rest of the body fading away into the border. "A Landscape in Rain," gives the effect of storm and rushing water with a few strokes of the brush; but each stroke tells, and each curve has a meaning. This capacity of expressing much with very little apparent effort is shown in the figure of a woman, whose dress has no shade on it, but a few strokes express the turn of the body and the folds into which the drapery falls. "The Thousand Carp," like "The Hundred Cranes," is a *chef d'œuvre* of careful study. Looking at a shoal of carp as one might through the glass of an aquarium, we see them floundering about in

all kinds of positions, twisting and twirling about, and fading away in the distant water.

Some of the humorous pictures are very funny. "Tortoises on the March" is delicious in the rendering of the clumsy reptiles' efforts to run. "Turning the Tables" shows us a group of frogs riding and tormenting a snake. Some have on high hats, some carry fans, while others smoke and dance and otherwise disport themselves. Another picture of the same series shows us a cat tortured by rats and a man dragged in bonds by wolves, hares, rabbits, etc.— a subject to be suggested to sportsmen. The "Fox's Wedding" is exceedingly quaint also, parodying as it does the Japanese ceremony of marriage.

Of birds there are multitudes, all painted with equal dexterity, and one cannot but envy the men who can handle a brush with such facility and precision. Whether the future seat of art, the future great schools of painting will be in Japan, as the commissioners predict, is doubtful; we may learn much from the Oriental in decorative art, although we shall probably never equal them. But in pictorial expression we shall most likely keep our supremacy, because we progress. Our portraits may not equal Titian's, our subject-pictures certainly are a long way behind Raphael's, but yet, our art is living, because we see with our own eyes. Japanese art is conventional; like modern paintings of the Greek church, it differs little from what it was centuries ago. Pessimists may think that European art died in the sixteenth century, but never was there such a school of landscape-painting as in our own time, and latterly, a new line has been struck out in what may be called the poetry of common every-day life. While we are true to our modern instincts, while we look at Nature and really study her, we shall not go astray, but if we work upon the traditions of the past and see everything through dead men's eyes, we shall fail for the very same reason which is the main cause of the success of the Orientals — conventionality.

Even allowing that progress in European art ceased with the great Italians of the sixteenth century, still, up to that period, from the time of Cimabue, both painting and sculpture went through a continued course of development. Naturally, I mean development as regards knowledge of anatomy, of form, of color, and of general *technique*. As regards sentiment, perhaps there was more decadence than progress, arising from a change in feeling and in faith without a corresponding change in subject. The Greeks (and probably the Japanese also, could we judge their works from this point of view), passed through the same phase of art, continuing to produce subjects long after all faith in them had passed away. Hence, the decadence in Greek art in the early centuries of our era and in Italian art in the seventeenth century. But as soon as men perceived their error and determined to paint what was around and about them, art revived. The Flemish and Dutch schools, the Spanish, and later on the French schools, all developments one of another, show progress. In China and Japan, there has been nothing analogous to this. To connoisseurs there may be some slight difference in the various schools, but to the ordinary student their landscapes are all alike — there is not even the difference of style which we recognize in a Claude and a Turner. Then when we think of the treatment of landscape in a Mantegna or a Van Eyck, and in a Rubens, a Poussin, or a Constable, we see at once how essentially progressive all European art has been.

The Japanese Commissioners consider that the future schools of art will be seated in Japan and that we Occidentals shall flock there to study, but only on the condition that Japanese art returns to the lines of the fifteenth century, its purest period. This reminds one of the early Pre-Raphaelite movement in England. We all endeavored honestly to paint in the manner of the early Florentine artists and to see only through their spectacles. The craze did good; it enabled us to get out of the careless, sloppy manner which was then in vogue. But of the numbers who took it up, how many have remained faithful? Not half a dozen. Most of us have seen, like Millais, that it was only a means to an end. Revivals of all kinds do an immense amount of good; they rouse people out of sleep, they make them earnest, enthusiastic and thoughtful, and no doubt the Japanese are right in preaching a return to the best and purest periods of their art. Were they to try to assimilate their art to ours, they might succeed in the end as they have succeeded in grafting other Western ideas on to their own culture, but the world would lose an art which is unique, an art which is perfect in its own line, and which no other country can attempt to emulate. S. BEALE.

SOCIETIES

GERMAN TECHNICAL SOCIETY OF NEW YORK.

RESOLUTION regarding the Unsafe Large Groined Vault in the Assembly Chamber of the New Capitol at Albany, N. Y., passed in the regular session of the German Technical Society of New York, March 10, 1888: —

Whereas the German Technical Society of New York after a careful examination of treatises published by its Corresponding Secretary, H. W. Fabian, in the *American Architect and Building News* (October 29, 1881, and March 29, 1884), has been convinced that the dangerous condition of the large groined vault of the Assembly Chamber of the New Capitol at Albany, was justly and correctly criticised by him already some years ago, and

Whereas a development of the monumental building art, keeping pace with modern technical researches should be striven for,

Be it resolved that we indorse the following summary of Mr. Fabian's statements as fully corresponding with the facts and submit the same to the public:

1. The main cause of the instability of the vault is based upon the form of the inner construction, the lines of pressure in the bearing ribs considerably deviating from the middle lines. Hence follows an exceedingly unequal straining of material in the dangerous cross-sections and the existence in the outer fibres of strains of pressure considerably exceeding the allowable maximum. The resultant of the normal forces in the weakest cross-sections acting considerably outside of the central core, tensile strains are produced, which involve the cause of enormous deformation. These facts are sufficient to fully explain the endangered stability of the vault.

2. The construction of flying-buttresses, joined together by iron tie-rods in order to gain the balancing power between the horizontal thrusts of the smaller and larger arches, is not in accordance with the demands of sound vaulting architecture. Two arches will be in equilibrium if in both the product of the radius of curvature multiplied by the height of load both taken in the summit is equal. According to this law the problem might have been solved without employing flying half-arches and tie-rods. This manner of construction is objectionable on account of the unequal expansion of iron and stone; every change in temperature will cause a vibration in the arch system, which vibrations in the course of time might imperil the stability of the vault. It is not believed, however, that the essential causes of the present deformation are to be sought in this direction.

3. Nor can the stated unequal settling of the columns be seriously considered in judging of the deformation, it being in comparison insignificant with the great dimensions of the vault. Both faults, this as well as the aforenamed, might indeed contribute to the aggravation of the defective condition, but not of themselves cause of it.

4. The attempt of the architect to ceil the Assembly Chamber with a monumental stone construction can be but approved. The art of vault building, as it has come to us from the Middle Ages is, however, constructively impotent to cover areas of this size. The ceiling of our large modern halls with stone vaults can therefore only be attained, when in place of the historical vault-lines, there are employed mathematically developed arch-lines, which coincide with the lines of pressure. Then the material in all its parts would *be strained quite uniformly* and only influenced by pressure. The additional load as employed at Albany to improve the lines of pressure in the pointed arches could then be dispensed with and thus the total load be considerably decreased. There is no doubt that a groined vault built on such principles of construction can be employed for the Assembly Chamber at the Albany Capitol without fears as to its stability.

In the interest of progress in monumental architecture which is insolubly connected with the employment of stone as a building material, it is therefore to be desired that the Legislature should adopt a resolution to that end.

The adaptability of the old material in case of reconstruction of the vault undoubtedly deserves some consideration in the light of the foregoing. In behalf of the Society,

The Committee {
ROBERT STRICKER,
AUGUSTUS KURTH,
MAX C. BUDELL,
F. KNAUER,
E. A. GIESELER.

COMMUNICATIONS

THE INDIANA SOLDIERS' MONUMENT COMPETITION.

TORONTO, CAN., April 12, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — In reference to the Indiana State Soldiers' and Sailors' Monument competition, can you tell me who has received the premium offered for the second best design. I am, yours truly,

ONE WHOSE DESIGN HAS NOT BEEN RETURNED.

[THE second place, also, was awarded to a foreigner, an English architect, Mr. Percy G. Stone. — EDS. AMERICAN ARCHITECT.]

NEW YORK, April 7, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — I feel sure it would give great pleasure to your subscribers to see published in the *Architect*, the prize design of the Indianapolis Soldiers' Monument competition, and, for comparative purposes, as many of the other designs submitted as are accessible.

Very respectfully, ALEX. DOYLE.

[THE *Inland Architect* for April contains the designs offered by many of the best known architects in the country. — EDS. AMERICAN ARCHITECT.]

REMOVING OIL STAINS.

BUFFALO, N. Y., April 14, 1888.

To the Editors of the American Architect: —

Dear Sirs, — We would like to ask if there is any way to remove oil stains from a hearth of Corse Hill Sandstone — it is a perfectly smoothed rubbed surface and the stains show badly — would it help matters to oil the whole stone? Very truly yours,

Marling & Burdett.

[It is possible that fuller's earth or powdered French-chalk, if applied warm and under slight pressure, may absorb the oil if recently spilled. Oiling the whole stone would modify the evil, if the first coat were applied only to the untouched parts. — Eds. American Architect.]

NOTES AND CLIPPINGS

Rose-hedges as Snow-guards. — The plentiful experience of deep snow which Europe has had this winter has set practical men thinking of better means of protection against this great obstruction to traffic. And the question of defending lines of railway against snowdrifts has been raised in Austria and Hungary. A rose hedge is now said to be the most effective defence. More than a mile of one of the Hungarian railways has been this winter kept clear of drifts by a rose-hedge about six and one-half feet high and three and one-quarter feet thick, although this section of the line had always in previous years been liable to be blocked. The rose best adapted for this purpose is the rose of Provins, now incorrectly corrupted into the rose of Provence. But doubtless there are many other kinds equally serviceable; the essential thing is that the hedge shall offer a solid obstacle to the drifting snow. It will be a great improvement, certainly — apart from all practical considerations — if we could be induced to make our lines of railway blossom with the rose. At present the banks which border our lines are neither useful nor ornamental. Here and there a little kitchen garden flourishes, or a fowl-keeping station-master cultivates sunflowers for his birds. But there is no serious attempt either to grow cabbages or cabbage roses along the lines. In Brittany the lines run between small fruit gardens, with innumerable pear and apple trees trained espalter fashion at the sides, and the practical cultivation of fruit trees is adopted along the high-roads in Germany. We might take a leaf out of our neighbors' books either in the useful or ornamental direction. — *London Globe.*

Risks of Research. — The dangerous quests upon which enthusiastic chemists may embark are strikingly illustrated by the case of the yellow, oily substance called chloride of nitrogen. This terrible explosive was discovered in 1811 by Dulong, who lost one eye and three fingers in a vain attempt to ascertain its composition. So powerful is it that when Faraday and Sir H. Davy took it in hand, they provided themselves with thick glass masks to protect their eyes from flying bits of glass, and to some extent from the irritating vapors of the oil itself. Faraday was on one occasion stunned by the detonation of only a few grains of the compound, and bits of the tube in which it had been contained almost penetrated his mask. On another occasion Sir Humphrey Davy was severely injured by the explosion of a few drops under the receiver of an air-pump. Since their time the precise composition of the oil has been a mystery. At last, however, Dr. Gattermann, of Göttingen, has succeeded in its analysis. He finds that the substance examined hitherto was impure, and that the extreme danger of handling it was partly due to that fact and partly to the varying action of light. Any bright light, he has found, is enough to produce detonation, a discovery made by the sudden destruction of his apparatus by a stray sunbeam. Chemical research nowadays is apt to stray among the teeming pastures of organic chemistry, to the neglect of the old problems offered by the inorganic world, though the solution of these problems belongs to the highest efforts of experimental science. — *London Daily News.*

A Subterranean Chapel. — An El Paso despatch of April 9 to the St. Louis *Globe Democrat* says: An interesting discovery has been made in an old Spanish mine on the property of the Corralitos Cattle and Mining Company, on the Casa Grande River, in Northern Chihuahua, an immense estate belonging to El Paso and New York parties. The mine is called the San Pedro, and there is on it an old incline going into the mountain at an angle of forty-five degrees, and evidently following the richest ore streak in a zigzag manner. At the end of this incline a subterranean chamber was found, which had been fashioned evidently with great labor and trouble, into a regular Catholic chapel. The Chamber is some thirty feet high. Seats have been cut from the solid rock running all around the chapel, and so have been an altar and a pulpit. The whole was found neatly whitewashed, and presents a peculiar and weird aspect. The ancient chapel could be used at a moment's notice as a place of worship. The whole country adjacent to the Casa Grande and Santa Maria Rivers is full of objects of interest to the archæologist and naturalist. Prehistoric ruins are found everywhere, many of them clearly traceable to the Aztecs, but others evidently antedate any authentic records of history. A richer field of exploration and investigation cannot be found anywhere in North America.

Efluonne, the Universal Solvent. — *Iron* gives an interesting account of what it calls "the universal solvent," and which, it declares, though long known to modern chemistry, has only just been separated, and cannot even now be retained in its isolated state, simply because it destroys everything. This fury of the chemical world, it goes on to say, is the element efluonne. It exists peacefully in company with calcium in fluorspar, and also in a few other compounds, but when isolated, as it recently has been by M. Henry Moissan, is a rabid gas that nothing can resist. It combines with all metals — explosively with some. If they are already combined with some other non-metallic element, it tears them from it and takes them to itself. In uniting with sodium, potassium, calcium, magnesium and aluminum, the metals become heated even to redness by the fervor of its embrace. Iron filings, slightly warmed, burst into brilliant scintillations when exposed to it. Manganese does the same. Even the noble metals which, even at melting heat, proudly resist the fascinations of oxygen, succumb to this chemical syren at a moderate temperature. Glass is devoured at once, and water ceases to be water by contact with this gas, which, combining with its hydrogen, at the same moment forms the acrid glass-dissolving hydro-fluoric acid and liberates the ozone.

The Active Poison in Human Breath. — Professor Brown-Séquard has recently been making experiments to determine whether the human breath was capable of producing any poisonous effects. From the condensed watery vapor of the expired air he obtained a poisonous liquid, which, when injected under the skin of rabbits, produced almost immediate death. He ascertained that this poison was an alkaloid and not a microbe. The rabbits thus injected died without convulsions, the heart and large blood-vessels being engorged with blood. Brown-Séquard considers it fully proved that the expired air, both of man and animals, contains a volatile poisonous principle which is much more deleterious than carbonic acid. — *Science.*

TRADE SURVEYS

The customary statistics of trade, transportation and finance show very little change in business circles. The influences which have been controlling since the opening of the year still continue. Values point downward in some channels, in others they are steady, in a few prices are advancing. Production is kept under control and the restricted output in so many industries cannot help but restore the equilibrium. A few outside influences are at work, such as tariff agitations, but they are being discounted and a general improvement in business is looked for by midsummer. In the iron and steel industry demand is slack. The restriction in blast furnace output is 30,000 tons per week. Mill output is twenty per cent less. Rail-makers have sold one million tons this year and the most recent indications are more favorable. So far the mileage this year has been slightly over last year and a great deal of construction work is projected for the near future. The conclusion that there will be a collapse in railroad-building is not well based. The expansion of manufacturing, the development of mines, the outflow of population, all go to make continuous railway construction advisable as permanent investment, even though immediate returns are not assured. The often-repeated warnings as to the disastrous consequences to business from the investment of extraordinary amounts of capital have but little weight with investors, and enterprises of every character are engaging attention. Iron making is expanding in the South to an extent that is forcing Northern makers into still further efforts in the South. Car works, equipment establishments, stove works, ice manufactories and shops for a hundred purposes are projected for erection this year. What is lost in railroad construction will be made up in other work. Two mines will be opened for one last year and productive capacity will be increased from one hundred and twenty tons annual coal output to one hundred and thirty million tons. The further and legitimate enhancement of lands West and South must continue, especially if the united efforts of Southern railroad managers and high church officials should be successful in deflecting the tide of immigration southward, as is to be tried. The development of lumber traffic promises to maintain the firm spring prices throughout the season. Chicago stocks are larger than a year ago, but the extending Western markets will probably lessen the supply of lumber that it will be necessary to throw on Eastern markets. Besides Southern yellow and sap pine will be twenty-five per cent more abundant this year and Eastern dealers are even now beginning to doubt whether, with the more restricted white-pine supplies, they can hold the Southern products at present prices. There will be a large amount of building in rural localities in the New England and Middle States this season, one cause being the desire of large and small manufacturers to move into smaller places where land and taxes are lower and other advantages are within reach. So far this season the projection of building work has not in the aggregate fallen below 1887, but its character is somewhat different. Country work will be more abundant. Railroad work is increasing. A larger number of public buildings will be erected. In the South manufacturing enterprise will not stop for repairs. In the Northwestern wheat-belt, elevators, both railroad and individual, are to be built. In general, railway equipments will be improved. Fewer vast enterprises will be launched, but no harm will come from this. Notwithstanding the notice served last year on brick-makers, it is said the supply will be so near actual requirements as to give makers quite comfortable margins. Prices will be firm throughout the Middle and Northwestern States. Contracts have been closed during the past month for the entire production for the season of a great many yards. Cement is active. Lath and shingle supplies will be ample, but this will be due to enlarged preparations in Michigan and three or four other States. Glass of all kinds will not decline, as importations will exercise a restraining influence. The works are all running full time and peace will prevail until the fires are put out in June. The flint strike continues. The spirit of trade combination is still at work among manufacturers of all kinds of building and constructive material, but the efforts made do not work to the detriment of builders. Price lists are modest. The slightest effort to put prices above a living limit jeopardizes a combination among producers or manufacturers where there is a considerable number to consult and assent. Productive capacity, it is apparent from attentive observation, is growing much faster than demand, at least as demand has been expanding within the past decade or two. Some controllers of large sums of money look for the compensating dulness or reaction, in which period enforced transfers of property will be made by the weaker to the stronger, who are generally the money lenders. An absorbing of little concerns into greater will set-in in time, especially in the South, where industrial enterprise is at fever heat. The bulk of investments made there are now prudently made with that end in view. If any disaster is awaiting the business world, it is not from the concentration of capital or the combination of producers. Their movements are controlled by agencies which they cannot evade and the best interest of the great public is conserved by forces, both economical and legislative, which develop themselves just at the right time.

S. J. Parkhill & Co., Printers, Boston.

THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. XXIII. Copyright, 1888, by TICKNOR & COMPANY, Boston, Mass. No. 644.

APRIL 28, 1888.

Entered at the Post-Office at Boston as second-class matter.

CONTENTS

A GOOD deal of discussion is going on just now about forms of building contract. The National Association of Master-Builders' seems to have opened the discussion, a year ago or more, by the appointment of a committee to consider the subject of drawing up a model building-contract to be officially adopted by the Association, but the matter has occupied the attention of various bodies of architects as well as builders, and as the Committee of the Builders' Association was sensible enough to invite a few architects to join in its deliberations the subject may fairly be said to be formally before the two professions. For our own part, we are inclined to think that the proper position for architects to maintain, unless applied to for advice by the builders, is that of critics, rather than promoters of any particular form. After all, the contract is between the owner and builder, not between the builder and the architect. It is the duty of architects to guard the interest of owners in contracts, so far as they can fairly do so, and they should, both individually and collectively, carefully avoid the appearance of going out of their way to invent forms, of contract which may be more acceptable to builders than those now in use. If the builders object to the current forms they are at liberty to say what changes they wish to have made, and if they unanimously resolve to insist on any stipulation whatever, the owners must submit, and the architects, if their powers of persuasion prove unavailing, have no further responsibility on that particular point. So far as the architects' own comfort is concerned, most of them would be glad to see an unchangeable form of contract adopted, covering all conceivable points, which would relieve them of the anxiety of drawing up contracts in their own way, but until the matter has gone beyond discussion, they should, as a class, feel themselves, to some extent, entrusted with the duty of defending the rights of owners in general. At the last Convention of the Association of Master-Builders, certain rules were drawn up, and recommended to local societies for adoption, which have already been printed at length in these columns; and the Canadian builders have recently adopted a form of contract prepared for them, and, it is said, will now refuse to sign any other.

IN some respects the Canadian form is more favorable to the owner than the rules of the American Association. The Canadian contract, for example, provides, as do most existing contracts on this side the line, that specifications and drawings shall be regarded as coöperating, so that work shown on one and not on the other shall be included as if mentioned in both, while the American rules provide that demands made by the plans, and not referred to in the specification, shall not be considered in the estimate offered. In our opinion the Canadian form is in this respect the only fair one. No architect in this or any other country can describe a building completely either by specifications or plans alone. Both sorts of documents together are barely enough to enable the most careful architect to show all the items which he wishes to include in the contract, and so long as both plans and specifications are open to the builder to study in making his estimate, there is no more reason for his leaving out anything shown on one because it is not mentioned in the other than there would be for omitting the items on certain pages of the specification. If the plans and specification do not agree, the architect is ready to decide which shall be followed in estimating, and to make a note of his decision, so that with reasonable care on the part of the builder, such as contractors' associations should endeavor to inculcate, there is no chance of misunderstanding under the Canadian form, while the American rule opens the door to all sorts of extras, quarrels and dissatisfaction. Again, by the Canadian contract the builder is not allowed to sub-let the whole or any portion of the contract without the written consent of the architect, while the Americans stipulate that the contractor shall not be restricted as to whom he employs as sub-contractor unless previously notified. It is not quite clear whether the American rule requires that the architect shall notify the contractor not to employ certain persons, or to obtain his consent to sub-contractors. If it means the latter, the stipulation does not change the ordinary form; if the former, every architect is to be obliged to lay himself open to a dozen libel suits, if he wishes to protect his client against the transfer of his contract from a good builder to a bad one, and is even then liable to see some strange rascal from a neighboring town substituted for the careful and responsible builder whom he had persuaded the owner to contract with at an extra price, for the sake of getting his work well done. In regard to forfeiture for delay, the Canadian contract provides that where delay occurs by reason of inclemency of weather, or strikes of particular trades, the architect shall extend the time of completion to a reasonable amount. The American rules say nothing about allowance of extra time for completion in case of special circumstances, but content themselves with the rather childish demand that where a penalty is to be exacted from the builder for delay beyond a certain date, a premium of like amount shall be paid to the builder if he completes his work before the given date. It ought to be obvious enough that if an owner has, for example, given a lease of the house he proposes to build from a certain date, as often happens, or if he has arranged to give up his present residence on a fixed day, and move into his new one, he has a right to be compensated for any damage he may suffer through the failure of the builder to keep the promises he has voluntarily made; while, as it is of no advantage to him to have his house on his hands before the time at which he or his tenant is ready to move into it, but rather an injury, since a house hurried in building is never so good as one constructed deliberately, there is no reason whatever why he should pay the builder a premium for encumbering him, before the stipulated time, with a building that he has no use for, and is, through the haste with which it was built, of less value than he intended and agreed to have it. Moreover, it should be remembered that the contract in present use, by which an allowance of time is made to the contractor in case of strikes or unusually bad weather, protects the interest of the contractor against his workmen at the cost, and often to the very great inconvenience, of the owner, who makes perfectly definite promises, in return for very elastic ones on the part of the builder. In addition to this concession, all builders and architects can testify that the penalty for delay stipulated in the contract is very rarely enforced. If the fear of it serves its purpose in keeping the contractor nearly to the time of completion to which he has agreed, this is all that is usually required of it, and cases where a builder who has honestly tried to keep his promises has been obliged to suffer for a few days' or even weeks' delay beyond the contract time of completion of his work are, in our experience, almost unknown. We think that the rights of both parties are better guarded by providing that forfeiture shall not be exacted for delay from causes which in the opinion of the architect could not have been reasonably foreseen or avoided by the contractor than by the Canadian clause, requiring the architect to extend the time of completion in case of strikes or inclement weather; but either is better than to set up, as the American rules will do, a struggle between the owner and the builder, to see who can extort, at the end of the work, most money that he has not earned, and is not justly entitled to, from the other.

ONE more point that should be carefully considered by all the projectors of improved building contracts is that of arbitration. Most of the old forms of contract, and many of the new ones, provide that disputes between builder and owner shall be settled by two arbitrators, one chosen by each party, who shall choose a third, and the award of a majority of the arbitrators shall be final. At first sight, this method of settling controversies has a certain charm, but to most architects it soon loses its attractiveness, and so good a lawyer as Sir Edmund Beckett denounces it in unmeasured terms. On no account, as he says, should a building contract contain an arbitration clause, which simply commits the owner to the most expensive kind of lawsuit over every trifling affair that the builder may choose to require him to "leave out." Moreover, as a builder's claim in court must be sustained by sworn evidence, subject to severe cross-examination, and to the opinion of the architect, whose testimony generally determines the case, while any sort of story may be palmed off on arbitrators, and an unscrupulous man is more likely to get something awarded to him that he ought not have by arbitrators than by a jury, the arbitration clause sets a premium on quarrelsomeness and bold falsehood. Fortunately, perhaps, the ordinary arbitration clause in a building contract is not binding. The rule is that an agreement between two persons to "oust the courts of their jurisdiction" is void, as contrary to public policy, and until the award of the arbitrators is made, either party can refuse to be bound by it, and apply to the courts. After it is made, however, under ordinary circumstances, there is no appeal.

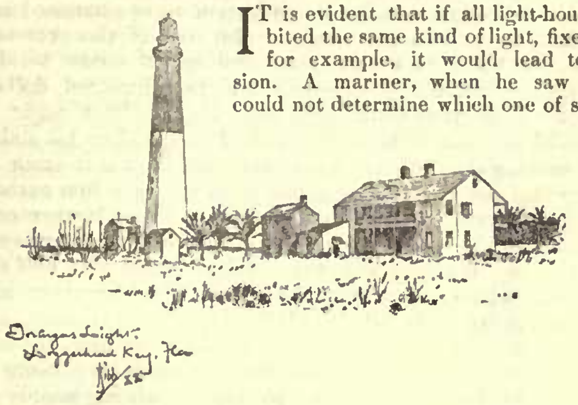
THE French "Architects' Mutual Defence Society," after about two years of existence, has, according to its last report, accomplished a considerable amount of work, and now finds itself full of business. It seems to have been very ably managed by its Committee of Administration, and to have enjoyed the advantages of consultation with lawyers of exceptional skill, for its efforts seem to have been almost uniformly successful, and it has won the earnest gratitude of those who have invoked its assistance. The routine of its operation seems to be, in case its aid is called in by a member, to ask for all documents relating to the matter in dispute. These documents, or copies of them, are discussed by the Committee of Administration, to see whether it is advisable for the Society to take up the cause. In case of doubt, the opinion of the counsel to the Society is obtained, and a decision arrived at, which is communicated to the applicant. If the decision is favorable to him, a retaining-fee is at once sent to the counsel for the Society, which then pursues the case to a final issue at its own expense.

IN many cases the appearance of the Society on the scene, as the defender of the rights of its members, leads to an immediate settlement of the dispute, and it would appear quite probable that as its reputation increases, and the list of its successful encounters with would-be oppressors grows longer, its influence in securing proper settlement of claims without recourse to law will be correspondingly extended. According to the Report presented to the General Assembly of the Society in 1887, seven cases were taken up on behalf of its members during the year and an eighth application had been under consideration, but not fully decided upon. Among the cases taken up was one involving an appeal to the Council of State on behalf of an architect, from the decision of a Prefectoral Council, which was successfully terminated, the higher court reversing, in favor of the architect, the decision of the court below, while another case pursued by the Society before the lower court and decided in favor of the architect, though not for the full amount claimed, was allowed to drop at that point by advice of counsel, the difference not being worth the trouble and cost of an appeal. This case, comparatively small as it was, will be interesting to many readers. The architect in question was invited to examine the ground and make sketches for a stable. He did so, and the sketches pleased the owner of the ground, who approved them, and directed the architect to make detailed drawings and specifications. When these were done estimates were made which showed that the cost would be five thousand dollars. Nothing more was done for about six months, when the architect called upon the owner to decide what he would do about the building. After some evasion, the owner replied that he had never intended to build a five thousand-dollar stable, that it would be ridiculous for him to think of such a thing, which would provide a more sumptuous lodging for his horses than he had himself. After more arguments, the architect brought suit for his pay, claiming one hundred and three dollars, or two per cent on the cost of the proposed building, for his work on the plans and specifications, besides seven dollars travelling expenses and two hundred dollars damages. The lower court held that the architect ought to have asked how much the owner wished to spend on his stable before making the finished plans, and that he was in error in thinking that the approval of a rough sketch gave him authority to make complete working-drawings without further consultation with the owner, and therefore decided that he was not entitled to any damages, and ought to be content with half the commission which he claimed for the working-drawings and specifications, and the whole of the travelling-expenses, and judgment was given to that effect. In the other case, the officials of a certain hospital pursued their architect on account of defects in the building designed by him, consisting mainly of partial decay of the stone through frost, cracks in the plastering, due, as they claimed, to improper lathing, and deflection in certain floors. Experts were appointed to examine the structure and found no indications of any other defects than these, and on appeal, the Council of State decided that such defects constituted simple imperfections (*malfaçons*), which, according to the well-settled law in France, were not to be regarded as vices of construction, threatening the solidity of the building, and could not therefore engage the special responsibility of the architect, and the hospital authorities were condemned to pay all the costs, as well as the expenses which the architect had incurred in defending the suit.

WE all take an interest in our dinners, and it will interest many people to know how fresh meat is now transported, by thousands of tons, from North and South America to England and France. It is only a few years since vast quantities of live cattle were carried across from New York and Boston to Liverpool, to be killed and eaten in Europe, and rumors were current that in some of the great passenger steamships, in dull times, a part of the staterooms were removed, to make room for cattle-pens. After some years, during which the cattle-shippers often suffered severe losses through disease or accident, the business fell off, and is now almost completely abandoned; the cattle being killed and dressed in the country where they have been raised, and shipped as meat, in vessels, which are, by ingenious processes, kept at a low temperature during the voyage. The means by which this low temperature is maintained, now consists, according to *Le Génie Civil*, of machines for blowing cold air into the meat store-rooms in the hold of the vessel, the air being cooled simply by expansion. As every one knows, the old-fashioned freezing-machines employed the expansion of condensed ammonia-gas as a refrigerating agent, conveying the cold current to the place where it was to be used by means of glycerine, or some other liquid not subject to freezing at ordinary temperatures. By the new method, the air is cooled by its own expansion, and then forced directly into the rooms. The air is first drawn into a condensing cylinder, where it is compressed under a pressure of about fifty pounds to the square inch. This greatly reduces its volume, and raises its temperature to nearly three hundred degrees, Fahrenheit. The next step is to carry off the surplus heat, which is done by means of a current of sea-water, circulating around the condenser, or rather around a series of tubes, into which the air passes from the condenser. To cool it still more, and cause the deposit of the watery vapor contained in it, the air next passes into another series of tubes, which are exposed to the current of cold air returning from the meat store-room, and is then drawn into the expansion cylinder. On being allowed to expand here, the temperature of the air falls immediately to about seventy degrees below zero, Fahrenheit, and the last traces of moisture are deposited as snow. Wooden tubes then convey the chilled air to the store-rooms, which it reaches at a temperature of about zero, Fahrenheit, and, after circulating about the rooms, is drawn back by an aspirating shaft to the refrigerating machine. The thermometer in the store-rooms never rises to the freezing-point of water, so the meat is kept continually frozen from the day of its shipment, perhaps at Melbourne or the La Plata River, until its arrival in the London Docks, where it is found to be indistinguishable from the best fresh beef and mutton. The store-rooms are protected against the entrance of heat by conduction from the outside by means of double walls and floors, packed with powdered charcoal.

ANCIENT AND MODERN LIGHT-HOUSES.[1] — XX.

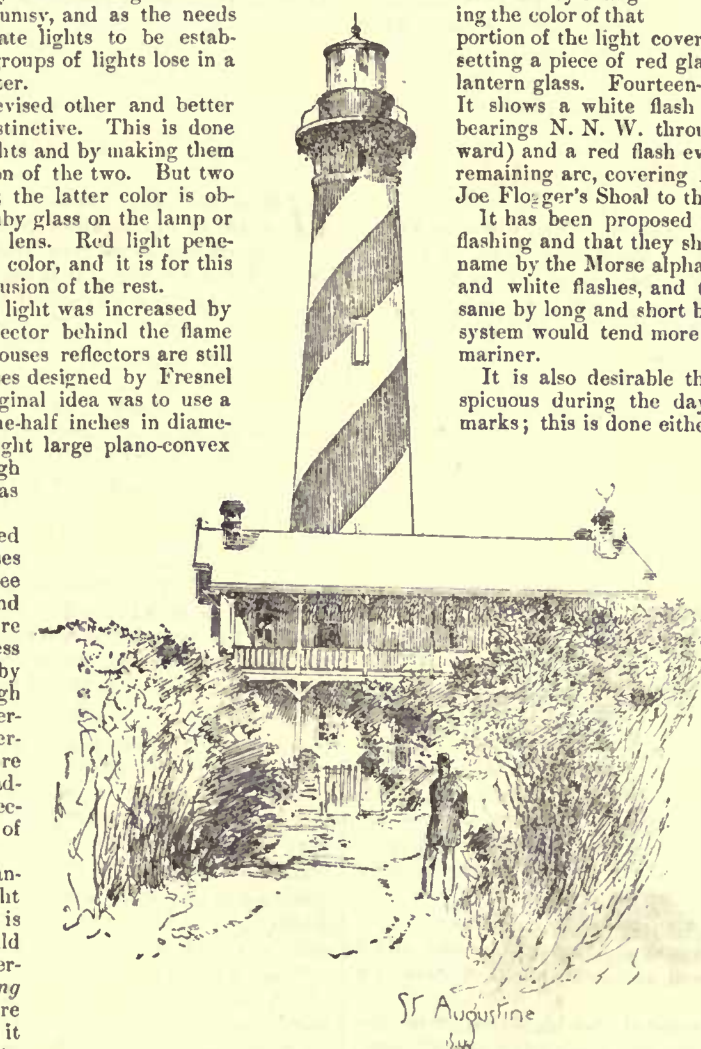
CHARACTERISTICS OF LIGHT-HOUSES.



IT is evident that if all light-houses exhibited the same kind of light, fixed white, for example, it would lead to confusion. A mariner, when he saw a light, could not determine which one of several it might be, especially if he were uncertain as to his reckoning. This difficulty was overcome by having different numbers of lights at neighboring light-stations. For example, on Little Brewster Island, Boston Harbor, there is one light, at Plymouth there are two lights at the Gurnets, at Nauset Beach, Cape Cod, there are three lights, at Chatham two and at Monomoy Point one light. This device is both expensive and clumsy, and as the needs of commerce require intermediate lights to be established from time to time these groups of lights lose in a measure their distinctive character.

More modern science has devised other and better means for making the lights distinctive. This is done by changing the colors of the lights and by making them fixed or flashing or a combination of the two. But two colors are used, white and red; the latter color is obtained by using a chimney of ruby glass on the lamp or a pane of red glass outside the lens. Red light penetrates fog better than any other color, and it is for this reason that it is used to the exclusion of the rest.

Formerly, the intensity of the light was increased by placing a silvered parabolic reflector behind the flame of the lamp, and in some light-houses reflectors are still used, but in most cases the lenses designed by Fresnel have been substituted. His original idea was to use a large central flame three and one-half inches in diameter and to arrange around it eight large plano-convex lenses three feet three inches high by two feet six inches wide, so as to refract the light.



This form of lens was improved by Condorcet for burning-glasses in 1788. If a lens three feet three inches in diameter were ground to a continuously spherical figure it would attain a great thickness at the axis and the loss of light by absorption in its passage through the thick glass, as well as by spherical aberration, would be considerable. But light-house lenses are so formed as to avoid these disadvantages. The figure shows a section and elevation of one panel of a lens.

If a lens has eight of these panels it will send out radially eight beams of light, and if the lens is made to revolve the observer would see flashes alternated by dark intervals. This is known as a *flashing white light.* If alternate panels are covered with panes of red glass it would be *flashing red and white.* It will readily be seen that quite a number of characteristics can be made by altering the number of panels and by covering up more or less of them with red glass.

The above is only suited to flashing lights. It was not until Fresnel extended his researches to the improvement of fixed lights that he completed the system of light-house illumination. He conceived the idea of forming a barrel of glass having the same profile as a vertical section through the axis of the lens just described. Such a lens allows the rays from a lamp in its centre to spread freely in a horizontal plane, while it only refracts them vertically, thus producing a powerful band of light equally all round the horizon.

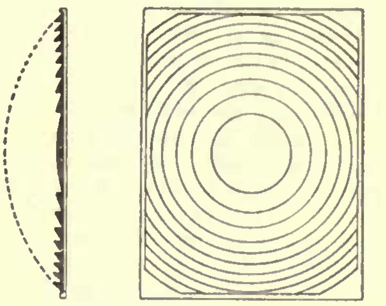
If flash panels, consisting of a set of vertical prisms, be made to revolve around the above lens, it becomes fixed white varied by white flashes; if half of the flash panels are alternately covered with red glass, the characteristic would be fixed white varied by red and white flashes.

[1] Continued from page 175, No. 642.

The various characteristics in use on our coasts are:

Fixed White	F. W.
Fixed Red	F. R.
Flashing White	Flg. W.
Flashing Red	Flg. R.
Fixed White varied by White Flashes	F. W. v. W Fl.
Fixed White varied by Red Flashes	F. W. v. R. Fl.
Fixed White varied by Red and White Flashes	F. w. v. R and W. Fl.
Flashing Red and White	Flg. R. and W.

The flashing lights are further distinguished by the interval of time between the flashes. For example, Boston Light is flashing white every thirty seconds; Gay Head, on the western point of Martha's Vineyard, is flashing white and red, interval between flashes, ten seconds, every fourth flash red; Sakonnet, on little Cormorant Rock, R. I., fixed white for thirty seconds, followed during the next thirty seconds by three red flashes at intervals of ten seconds.



Section and Elevation of an Annular Lens.

Dangerous shoals or rocks in the vicinity of light-houses are frequently indicated by changing the color of that portion of the light covering the danger. This is done by setting a piece of red glass of the proper width against the lantern glass. Fourteen-Foot Bank Light is a case in point. It shows a white flash every fifteen seconds between the bearings N. N. W. through E. to S. S. E. ⅛ E (from seaward) and a red flash every fifteen seconds throughout the remaining arc, covering Brown's Shoal to the southward and Joe Flogger's Shoal to the northward.

It has been proposed that all important lights should be flashing and that they should spell out the initials of their name by the Morse alphabet, by using long and short or red and white flashes, and that the fog signals should do the same by long and short blasts. I fear, however, that such a system would tend more to confuse than to aid the ordinary mariner.

It is also desirable that the light-houses should be conspicuous during the daytime, as they make excellent day-marks; this is done either by their shape or by some peculiarity in the way they are painted. When the background is dark they are usually painted white and when the background is light, the towers are either left the natural color, if built of brick or stone, or are painted some dark color. Sometimes both white and some dark color are used in horizontal bands, spirals or checkers. West Quoddy Head, Maine, has alternate red and white horizontal stripes. At Sankaty Head, Mass., the tower is white near the top and the bottom, with a red band in the middle. Fourteen-Foot Bank is brown. At Cape Henry, Va., the base, service-room and lantern of the octagonal tower are black; the shaft is colored on each face half white and half black, alternating so that the upper and lower halves of the faces show alternately black and white. At Cape Hatteras the tower is colored in alternate zones or belts of black and white, each zone twenty-two feet wide. Cape Lookout, N. C., is in black and white checkers. At Hunting Island, S. C., the tower is white from the base to the height of foliage of the background, the portion above this being black. At St. Augustine, the foundation of the tower is white, with a black cornice; the shaft is colored with black and white spiral bands. At St. Pierre de Royans, France, the plan of the light-house is a square. As it is intended as a day-mark, the upper part has been enlarged to obviate the possibility of confounding it with the steeples of the tower of Royan, and it is also painted in wide bands of red and white. The sketches show the appearance of some of these light-houses.

[To be continued.]

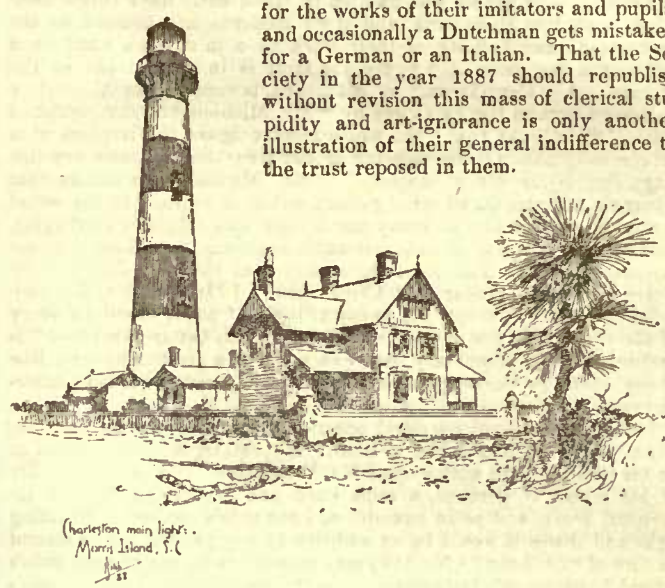
OLD MASTERS OF THE NEW YORK HISTORICAL SOCIETY.

Les Enfants du Rhone. M. Pagny, Sculptor.

IN an unknown, unfrequented, and rather unkempt quarter of New York stands the Library and Museum of the New York Historical Society. From the exterior the building looks quite promising, and, occupying as it does a corner of the street, one is naturally led to imagine that within it is airy, spacious and well-lighted, a place where the winter sun comes early and lingers late; but such is not the case. What may have been the original purpose of the building would be hard to determine, if indeed it was ever known, but from its internal make-up one might say it was intended as a tomb for the sacred bull Apis, or a burial vault for the Old Masters, and as a matter of fact it now subserves both of these purposes.

The vestibule and staircase with their shaded windows look dingy enough after the open street, but their lighting is as sunlight unto moonlight compared with the main building. Entering this, the visitor finds himself at the bottom of a three story, well-like interior — the light, such as there is, coming from the roof. On bright days the top gallery is visible except in remote corners, the second floor is not satisfactorily seen at any time, the first floor in its recesses is sometimes explored by the light of a candle, and presumably the ground floor requires the full flare of an electric light to see anything at all. Small, stuffy, insufficiently lighted and parsimoniously aired, this place answers as the junk-shop receptacle of the extensive and valuable collections of the New York Historical Society. Here in one grand *omnium gatherum* are upwards of 75,000 books and manuscripts, 62 marbles, nearly 1200 lots of Egyptian and Assyrian antiquities, and 800 pictures, to say nothing of the miscellaneous material which has been kindly unloaded upon the Society at different times and which has not yet found its way into the catalogue. How the Society has come into the possession of these valuables is a matter of history: the liberality of citizens gave it the Abbott Collection of Egyptian antiquities; James Lenox presented the Nineveh sculptures; and the collections of Messrs. Reed, Bryan, Dürr, and others furnished the pictures. How the Society has taken care of the legacies left to it is also a matter of history which reflects no great credit upon its members. There is a wounded-snake sort of enterprise now dragging its slow length along, looking toward more suitable quarters, and it is to be hoped it will succeed though such action should have been taken twenty years ago.

It would be useless to look for much system or arrangement of materials in such wretched, overcrowded accommodations as the Society at present possesses. Doubtless the immediate custodian of the collections has done the best he could, and in the department of books system perhaps does prevail. The sculptures are set up in chance places and could not very well be confused. The Egyptian antiquities are well enough cased in some respects, but are badly classed, oftentimes erroneously labelled, and catalogued in a primitive manner out of all keeping with the present advanced state of Egyptological knowledge. The pictures have suffered most of all. They have been hung without regard to any system whatever. The collections are mixed, the artists are mixed, the schools are mixed. Wherever an unoccupied spot could be found there a picture was nailed until now they occupy all the wall-space from floor to ceiling, all of the vestibule and staircases, and some if not most of the door-jambs, railings, and supporting columns. By a strange fatality the best pictures seem to have the worst berths, if there is any choice about it. Many of the Italians are placed so high as to be lost in the gloom, while a number of Dutch pictures are placed on the floor where the last sweep of the washer-woman's mop has liberally sprinkled them with dirty water. Possibly patriotism and not artistic taste gave Cole, Kensett, and Durand places on the lines which should have been occupied by their betters. The catalogue of the pictures is a conglomeration of facts, mistakes, false assignments, and adulatory remarks which well supplements the hanging. It seems to have been compiled by the donors of the pictures who evidently thought that every old picture was a good picture and every good picture was by a god or a demi-god of art. Hence it is that in a number of cases the great masters get credit for the works of their imitators and pupils, and occasionally a Dutchman gets mistaken for a German or an Italian. That the Society in the year 1887 should republish without revision this mass of clerical stupidity and art-ignorance is only another illustration of their general indifference to the trust reposed in them.



He who would attempt to bring order out of this disorder is a bold man — much bolder than am I who have for my purpose in this paper merely the casual noticing of some few of the principal pictures shown. The preface to the catalogue informs us that this is "probably the largest permanent collection yet exhibited on this continent," and it might have been added, as regards old pictures, the very best that this country possesses. That the genuineness of many of the canvasses is questionable does not prove them worthless. There are perhaps a hundred or more of the pictures that are excellent, no matter who painted them, and hardly any of the pictures lack interest from the point of view of history. The pity is that they are not in some place where art-students could see and study them, for they could teach many a valuable lesson. At present they serve no purpose and are sadly in need of soap, warm water, light, and fresh air.

The most notable and possibly, the most valuable picture in the collection is the "Infanta Margarita" of Velasquez. It is the child-portrait of Marie Thérèse, daughter of Philip IV and afterward wife of Louis XIV, and if I am not mistaken there is a similar portrait of her at about the same age in the La Caze collection of the Louvre and another painted at an earlier age in the Belvedere at Vienna. It is a bust portrait, three-quarters turned to the right (the one in the Louvre is, I think, turned to the left), and shows a rather surly-looking child of perhaps twelve years with an enormous head-dress of blond curls ornamented with feathers and jewels. The subject is not at all of a nature to please the average person and to the flippant it would appear rather ludicrous, but the painter has given the face a character, a haughty dignity seldom seen in a child, which commands our respect. The painting of it is in the strongest style of Velasquez, perfectly simple and devoid of catchy effects of light or of color, yet telling in its strength. He handled a brush in a way that would seem to baffle imitation. Neither the grounding or the finishing of a picture interested him much; he began with a full brush and ended in the same way, painting with the ease and simplicity of an ordinary house painter yet working with an object well in view. The portrait of the Infanta shows this manner of work and there can be little doubt of its genuineness. On the contrary the "Spanish Lady and Children," a portrait group on a large canvas, attributed to this master is very little in his style. The lights are too sharply contrasted with the deep shadows of the background and the colors are too spotty, catchy and florid for Velasquez. More likely it is a later Italian work but nevertheless a good one if perhaps a little bizarre in method. The "Portrait of Cinq Mars," which though "skied" may be well seen by climbing a ladder near at hand, is another good piece of painting but there is little except its sobriety to warrant its assignment to Velasquez. This is true also of the "St. John the Baptist" which is weak in flesh notes and handling as compared with the Infanta.

Murillo in the catalogue is made responsible for some half-dozen canvasses hung upon the walls but there is no certainty that any of them are genuine. "The Vision of St. Francis," showing the portrait head of an ecstatic monk with the eyes rolled heavenward, is probably by this painter, but it might easily be by one of his pupils or imitators. The full length of "St. Joseph" bearing the Infant in his arms and the "Adoration of the Shepherds" from the gallery of Marshal Soult look more like pictures of the Rubens school than

of the Spanish, but are not bad pictures from whatever school they may have emanated.

Of the Italian painters there seems to be a liberal representation from Cimabue all the way down to Titian, but again it is quite impossible to settle the matter of genuineness by internal evidence and the history accompanying the pictures is scrappy and hearsay in its nature. The pieces assigned to Cimabue, Guido of Sienna, Taddeo Gaddi and Giotto belong to the period when these painters flourished at least, and are valuable as illustrations of art-history if nothing more. The people who painted in those early days threw their whole souls into their work and if we moderns are blinded to the earnestness and honesty of their work by a misshapen hand or a stiffness in the pose of a figure, the fault is in us and not in the picture. A "Crucifixion," by Mantegna, is vouched for through a half-page note in the catalogue by "Mr. Michiels the distinguished critic," who thinks that "the whole picture bears the impress of a serene imagination; the coloring is sombre; the attitudes are distinguished by an air of majesty." Mr. Michiels also thinks that "there is afforded in no other gallery, public or private, in the world a similar opportunity to study the master and scholar (Correggio), side by side in works of unquestionable authenticity and the highest intrinsic merit." This refers to a sketch of the "St. Jerome" by Correggio, hanging near the "Crucifixion" of Mantegna, and a very handsome thing it is too, but to say of it that "never has the ecstacy of piety or the fervor of religious affection been better expressed" is rather more complimentary than exact. It is a good thing and like enough done by Correggio's own hand, but it is not one of his masterpieces.

Leonardo da Vinci executed some poorer pictures than the "St. John Weeping," attributed to him in the catalogue and declared to be his "on the high authority of Mr. Woodburn." It is undoubtedly of his school, if, perhaps, a trifle hard and mechanical for his individual brush, and as an example of Leonardo's method of handling light and shade, it would be an addition to any gallery. The second picture of "St. John" (No. 199) may possibly be by one of Leonardo's school, but even this is doubtful. The "Three Marys" by Leonardo's pupil, Bernardino Luini, bears unmistakable signs of its genuineness. The drawing is good throughout, and the sentiment and feeling of the piece is excellent. Unfortunately, the canvas is in bad condition, and it will probably be worse before it is better. A Perugino "The Adoration of the Christ," though signed and dated, is not in that master's usual style, but, for all that, may be by his hand and is certainly interesting.

In the same room, and near to the Perugino, are two pieces representing the "Birth and Resurrection of Christ," which "the donor wishes it to be understood" are authentic Raphaels. "Only the inexperienced and the uncultivated fail to trace in them the pencil of the divine Raphael," says the catalogue, and for fear of incurring the imputation of ignorance, we may admit all that the donor says aud still have nothing but two pieces of poor drawing, bad color and worse painting. If the pencil of "the divine Raphael" may be recognized by these features, then we recognize it, but, unless I am very much in error, I have seen the originals of these two pictures in some one of the European galleries classed among Raphael's youthful performances in the same category with the "St. George" of the Louvre. Andrea del Sarto, the best *painter* among the Florentines, is credited with a "Virgin and Child with Angels," which is, unfortunately, elevated so far ceilingward that it cannot be well seen. From a distance it seems to lack the freshness and transparency of Andrea's painting, and the coloring is not characteristic. But this might be the result of time and careless handling of the canvas, though the picture is more likely to be by a pupil and not the master. The Fra Bartolommeo's, four in number, all have an apochryphal smack about them disturbing to notions of inspiration. The best of them is a "Portrait of Savonarola," presumably a copy or possibly a replica of the Rubiera portrait. Lacking in inspiration likewise are some questionable things which pass in the catalogue under the names of Domenichino, Botticelli, Zuccaro and others; while, on the contrary, a "Portrait of a Princess of Florence," attributed to Bronzino, is full of spirit and strength, and is quite worthy of that most excellent portrait-painter.

A picture of more than ordinary merit called "Christ Shown to the Multitude" is put down to Sebastiano del Piombo, and aside from its lacking the richness of color that we are accustomed to associate in our minds with this artist, there is not the slightest reason to doubt its genuineness. It is a thoroughly good picture, whoever painted it, and one of the many extra good things in this collection. "The Martyrdom of St. Lawrence," by Titian, is another picture of a similar kind and of even greater importance. The lighting is a little exaggerated, which is not an unusual thing with Titian, and the drawing is in places distorted, another liberty often taken by this artist which resulted sometimes in strong effects as this picture will witness. The color has become much toned down by age and the canvas has darkened, but the flesh-notes bear the warmth and richness for which Titian was celebrated. The subject in its composition and general treatment is well known, Titian having painted it three times with some variations of detail. One of the pictures is in the Escurial and another at the Jesuits' College in Venice. This third one, belonging to the Historical Society, is a signed canvas and has the authority of Kugler for its genuineness who esteems it one of Titian's most important works. The portrait of "Aretino the Poet," by the same hand, rather lacks in breadth of treatment for Titian. It is, nevertheless, a strong piece of painting, though the character of the sitter varies somewhat in the picture from what we are told of him in literature. Aretino was the concentrated essence of impudence as his own letters prove, while Titian makes him look like a great blushing booby with scarcely assurance enough to brush away a fly. There is a rather interesting inscription in French on the back of the canvas which reads as follows: "Collection of Alix, General-in-Chief of Westphalia. — This precious picture was found in the wagon of a vivandière, named Michau, who was killed at the battle of Marengo. After being in the possession of General Lemarois, it passed into the private cabinet of the Chevalier Denon, Director of the Musée Napoléon." There are three of the Aretino portraits extant, and probably this one is a replica and not a copy by a strange hand. There is also in this collection a "Portrait of a Lady" (No. 209) attributed to the "Style of Titian," which would not hurt the reputation of the master himself, for it is a very handsome piece of painting.

To satisfy one's self regarding the authenticity of the "Christ and the Disciples at Emmaus," which is laid at the door of Paul Veronese, would not be an easy matter. The subject is one that he used several times, and there is a picture in Dresden similar in many respects to this one. It looks like a Veronese, and whether his or the work of another, it is a remarkably fine thing for the Historical Society to possess. The "Abraham Discarding Hagar and Ishmael," is again in his style, but it is not so important a picture. There are a number of good things by others of the Venetian school, among them noticeably "A Prince of Palermo in Disguise," by Giorgione, a "Repose in Egypt," and an interesting copy after Giorgione, by Watteau, called a "Concert." Of Tintoretto there are two pictures, one of which "The Martyrdom of St. Sebastian," appears to have some good points, but in its hanging it is so much like Gildroy's kite that one can make nothing definite out of it. This is the case with a rich red and orange canvas attributed to Bassano, which is probably a gem of some kind, but in its present setting it will not be seen any more than one of the "purest ray serene" which has long reposed in the dark unfathomed care of the ocean.

A small sketchy "Pieta," assigned to Annibale Carracci, deserves more than a passing notice. It may be original or it may be a copy, for he used the subject several times, but whichever or whatever it may be, the picture in this collection contains very great qualities. The figure of the Madonna, seated and holding the head of the dead Christ in her lap, is full of intense feeling; and there is the power of death in the lines and modelling of the figure of the Saviour, beautiful in its depth and truth of realization. To describe in words what is art, is very like telling one what is musical harmony. It is to be felt rather than to be told, to be appreciated by the emotion it excites rather than by an appeal to one's understanding. The "Pieta" is quite indescribable, but its power breaks upon one immediately that it is seen. Decidedly it is a great thing in imagination, and one of the first pictures of the collection. The "Arion and the Dolphin," though a signed canvas by the same artist, is a weak, poor thing, rather ridiculous in conception and thin in painting. Of course, it is in an excellent state of preservation. Time has not cared enough about it to destroy or injure it.

The Dutch and Flemish pictures outrank all others in point of numbers, but many of them are of an inferior order, and there are also some copies masquerading as originals. Still, the genuine examples cannot be counted upon one's fingers, and among those of unknown origin there are some pictures of much strength and excellence. The Rembrandts, even if authentic, hardly add much to the intrinsic value of the collection. The "Combat of Cavalry" is somewhat in the manner of Rembrandt in the centering of light and in the coloring, but he could scarcely have been guilty of the badly distorted horse's head and neck at the right of the canvas, or the spottiness of the foreground. The "Portrait" (No. 328) whether in Rembrandt's early style, or by one of his pupils, is good, but not great in any sense. Of the pictures attributed to Rubens, the "Christ Bearing the Cross," looks very much like his in color and flesh-notes, but it does not show him to advantage; the "St. Catherine" is a trifle weak and lacks in depth, but is undoubtedly of the Rubens school; while the "Portrait of a Knight of the Order of the Golden Fleece," though it cannot be set down positively either to Rubens or his great pupil, has excellent qualities, and stands on its merits independent of a high name.

One would hardly receive a lofty opinion of Van Dyke as a painter by an examination of the pictures assigned to him in this collection, but likely enough they are genuine. He was an improvident genius who did not despise the pot-boiler as a means of raising funds, and his facility often led him into doing inferior work. The "Samson and Delilah" may be a sketch for the finished picture now in the Belvedere at Vienna as the catalogue suggests. The composition of the two is almost identical, but there is somewhat of a difference in the coloring, and the sketch lacks the strength of the finished picture which is rather an unusual thing in art, too. "The Crucifixion" was a theme he handled in several ways, and the picture here shown is one of his palpable attempts to keep the pot boiling, though it is not more than half bad considering that Van Dyke was not a brilliant success outside of portraits. The picture of "Charles I" and the "Portrait of a Lady" are not in his best style, though the former is characteristic and interesting from its

history. Three heads of the king in different positions are painted upon one canvas, and this was done to enable Bernini the sculptor, who had never seen Charles, to model a bust of him.

A very interesting-looking portrait catalogued under the name of "Francis (*sic!*) Hals" occupies the top berth on a high supporting column where just enough of it is visible to make out that the breadth of treatment noticeable in the work of Hals is not strongly marked on this canvas. But for all that it looks like a good picture and might prove a very superior one if it could only be inspected at closer range. The Terborch portraits, three in number, are extra good. They are in his manner and possess the dignity and character of his treatment if not its breadth. The Brouwers again are all excellent. It is very doubtful if a copyist or imitator could produce so fine a thing as a "Dutch Interior — Beggars Carousing," though they might easily enough imitate the signature attached to it. The freshness and effectiveness of Brouwer's manner of painting as shown in this picture would baffle any but those to the manner born. The subject of drunken, leering beggars in an ale-house may not be beautiful in one sense to some people, but the handling, the richness of the tones, the quality and characterization, make it beautiful in another sense. The two pictures of a "Robber examining Coin" by daylight and candlelight, one of them nailed to a door-jamb, are again in Brouwer's style, and capital things in painting.

"Teniers the Younger" appears in half a dozen different canvases of variable degrees of merit. "The Village Fete" (No. 352) is a very fair work and probably painted in his characteristic vein; the 353 and 354 are poorer in every way, and it is questionable if the picture of "Charles V leaving the Town of Dort" was painted by him at all. Jan Steen is not disgraced by having an "Interior Family Scene" attributed to his brush, though the justness of the attribution may be considered questionable again. The color of it is pleasing and the painting is good, especially the rendering of textures in the dresses, but on the other hand the drawing is clumsy and bungling in places, and there is something lacking in it that we do not generally feel in viewing Steen's work. This is still more noticeable in the "Family Fête" (No. 511) which can hardly be Steen's though it is hung too high to see anything about it more than its general appearance.

Several pictures of the Rembrandt school are remarkably good, especially the "Mother and Child" of Jan Victoor, a strong piece of flesh painting; the beautiful study of light and shade called "The Magi going to Jerusalem," by Leonard Bramer, who is also represented by a "Presentation in the Temple" of uneven strength; and the "Tobias and the Angel" attributed to Ferdinand Bol. The latter is a large and important canvas showing Tobit and Gabriel discussing and gesticulating like a couple of Socratic philosophers in an Olympic grove, and is very nice in textures, light and drawing. There are several Wouvermans authentic enough, but of little importance except the large "Departure of a Hawking-Party of Nobles from a Baronial Castle," a fine thing of much spirit and rich in coloring. It looks as though it might have come from the hand of an Italian or Spaniard — say the one who painted the "Spanish Lady and Children" attributed to Velasquez; but Wouverman painted in that style at times.

It is to be hoped that the visitor at these galleries will not fail to notice the beautiful little architectural piece "Château and Park," by Van der Heyden, nor the "Goblet and Lemon" attributed to Van Aelst, which is not hung so high but that its strength and beauty are apparent. It is worth while, also, to call attention in a general way, since individual mention of all the Dutch painters represented here is impossible, to several excellent Cuyps, some candlelight pictures by Honthorst, a number of marines by Van de Velde and Backhuisen, a portrait by that excellent painter Ravensteyn, a wind-mill by Jan Van de Meer, a number of small pieces by the Ostades, and some pictures by Dou, Netscher, Berghem, Both, Van Gelder, Francken the elder, Fyt, Hobbema, Massys, Philip de Champaigne and Van Eyck of more or less genuineness and interest.

The pictures of the French school are fairly representative in numbers if not over-strong in individual cases, but then it will be remembered that the old masters of France are rather few and far between as compared with those of Italy and the Low Countries. The Poussins appear advantageously enough, Nicolas with half a dozen canvases, of which the "Adoration of the Golden Calf" is a good example of his clever composition, classic style, lack of sympathy, weak values and tawdry color; Gaspard by several landscapes out of which expert logic could prove or disprove almost anything desired without satisfying any one as to truth or falsity of deduction.

There are several pictures of the school of Claude and one canvas of "Odysseus taking leave of Penelope" which seems, so far as a casual examination may determine, to be in the style of Claude himself. The subject and the treatment of the water, sky and architecture are certainly in his manner, but he, like every other artist of note, had his score of imitators and followers. The picture is good, especially in the painting of the water. Boucher, who did some clever if rather light-natured work during his life, hardly shows at his best in the two pictures by him in this collection. The "Winter Scene," with the girl in sledge without a hat and a man behind pushing, is heavy and not so bright in colors as Boucher usually painted, but it is unique, decorative, and very well worth having. The same may be said of the Greuzes half a dozen in number. They are not works of sublimity, but dashes of beauty lightly blown from the brush like sparkling spray from the wave. The "Nymph of Diana" holding the coral in her hand is a nice piece of drawing and a delicate, refined work throughout. To be sure she is not an austere Athena nor an Angelesque Sibyl; she is only an empty-headed young girl, but her beauty makes her welcome.

The Watteaus must all be taken with due allowance for the skilful fingers of Pater and other imitators. Among the half-dozen canvases attributed to him, only one of them — the "Scene from M. de Pourceaugnac," I think, shows in the brush-work of the drapery a close resemblance to the manner peculiar to the artist. "The Venetian Fête" (a nice color scheme) and the "Musicians" are both good pictures but they are not by Watteau. The decorative sketch of a ceiling now at Dijon of "France Triumphant after the Restoration of Louis XVIII" by Prud'hon, the fine portraits by Mignard and Rigaud, a well-painted church interior by Anton de Lorme and some pieces supposed to be by Chardin, Courtois, Bourdon, and others, are all interesting to look at if not very elevating in imagination or overpowering in execution.

The picture of "Christ and the Tribute Money" with the finely-painted heads of the monk and nun supporting it on either side and completing the triptych make one of the most interesting exhibits in the galleries. The head of the nun is a marvel of delicacy, and the centre-piece with its bright fresh coloring, good textures, and beautiful sky and background offers strong reminders of that famous painter, Albrecht Dürer. His name is signed to the picture and the style is his with the exception of the brush-work which is perhaps a little too heavy for Dürer and suggests the possibility of a clever copyist or imitator. However that may be, the picture would be quite as beautiful by the name of Smith or Robinson, and if it is not Dürer's then it is by some one who was not far behind him in ability though perhaps unknown to fortune and to fame. The Holbeins, two in number, are probably genuine, but hardly worth putting one's eyes out looking at them many times. A poor picture by a great artist is always a knock-down blow to a hero-worshipper and Holbein's "Interior of a Private Chapel," with the family of Count Valkeniers at prayer, does not make one feel like joining in the service. Much more satisfactory is the oft-repeated "Venus and Cupid" of Cranach, with its archaic appearance and honest hardness of line, or the handsome and genuine-looking portrait of Frederick Barbarossa. Often times blunt awkwardness is preferably too slipshod skill and Cranach's best is much to be preferred to Holbein's tolerable.

The English school has no representation worthy of mention. There are portraits by Lely, Lawrence and Reynolds, but no one would care to look at them the second time. On the contrary, the only original and indigenous American school is brought to the front with a flourish of trumpets and made to occupy the seat of honor. Thomas Cole with his "Course of Empire," an epic poem written with a paint-brush through six canvases and innumerable cantos, stands first in size, first in the catalogue, and evidently first in the hearts of his countrymen. The other members of the Hudson River Olympus are well-known and those who are not familiarly acquainted with their landscape art can easily become so by visiting the galleries of the Historical Society where their quality is numerously and conspicuously displayed. The Copley-Pease-Elliot-Trumbull portraits in the possession of the Society are materials of another character and sufficiently interesting in themselves.

John C. Van Dyke.

THE ILLUSTRATIONS

[*Contributors are requested to send with their drawings full and adqeuate descriptions of the buildings, including a statement of cost.*]

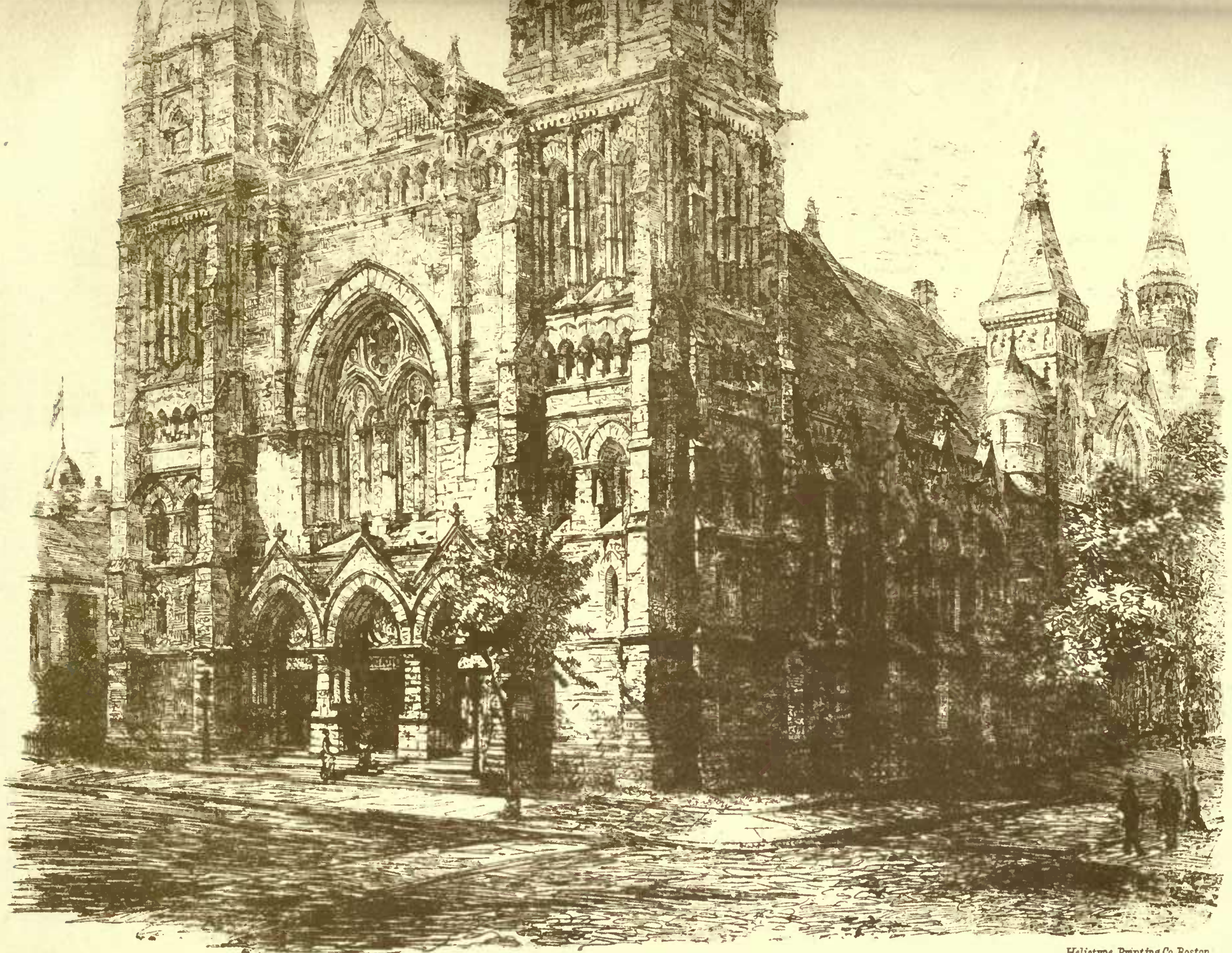
INTERIOR OF EMANUEL BAPTIST CHURCH, BROOKLYN, N. Y. MR. FRANCIS H. KIMBALL, ARCHITECT, NEW YORK, N. Y.

[Gelatine Print issued only with Gelatine and Imperial editions.]

EXTERIOR OF THE SAME CHURCH, AFTER AN ETCHING BY MR. HENRY S. IHNEN.

When the architect was asked by the committee to make drawings, they required him to conform to the accepted form of seating in Baptist churches, with a pitched floor. There were to be no columns to intercept the view of the chancel, and galleries were to be provided. The lot being 90 x 89 feet, or nearly square, it seemed best to try to give length, otherwise the auditorium would have the effect of a hall, not a church. Two columns were introduced, as will be seen by the plan, which are not in anybody's way and are purely constructive, not merely ornamental. They support longitudinal trusses which are indicated in the church by heavy beams. By this, the effect is that of a nave with transepts, and the square form is lost sight of. These columns also support the angle where galleries meet.

The next feature is the baptistery. The regular arrangement of a tank in the floor, requiring the pulpit to be moved to one side, seemed undesirable, therefore, it has been made a *fixture*, the height being regulated so that the pulpit is never disturbed.



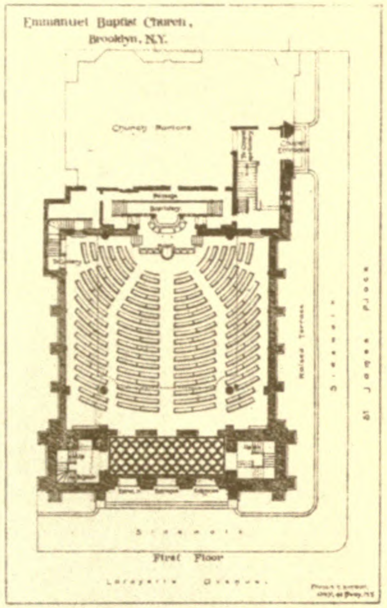
Heliotype Printing Co. Boston.

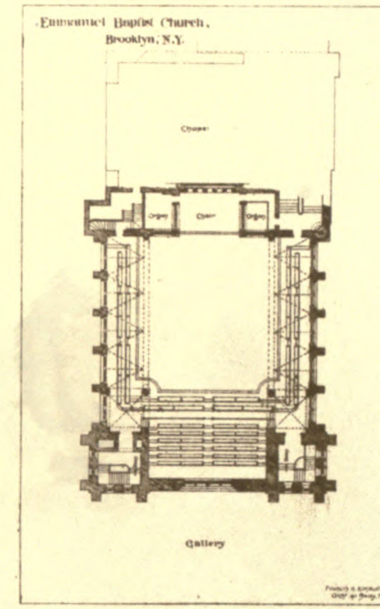
·EMANUEL·BAPTIST·CHURCH·

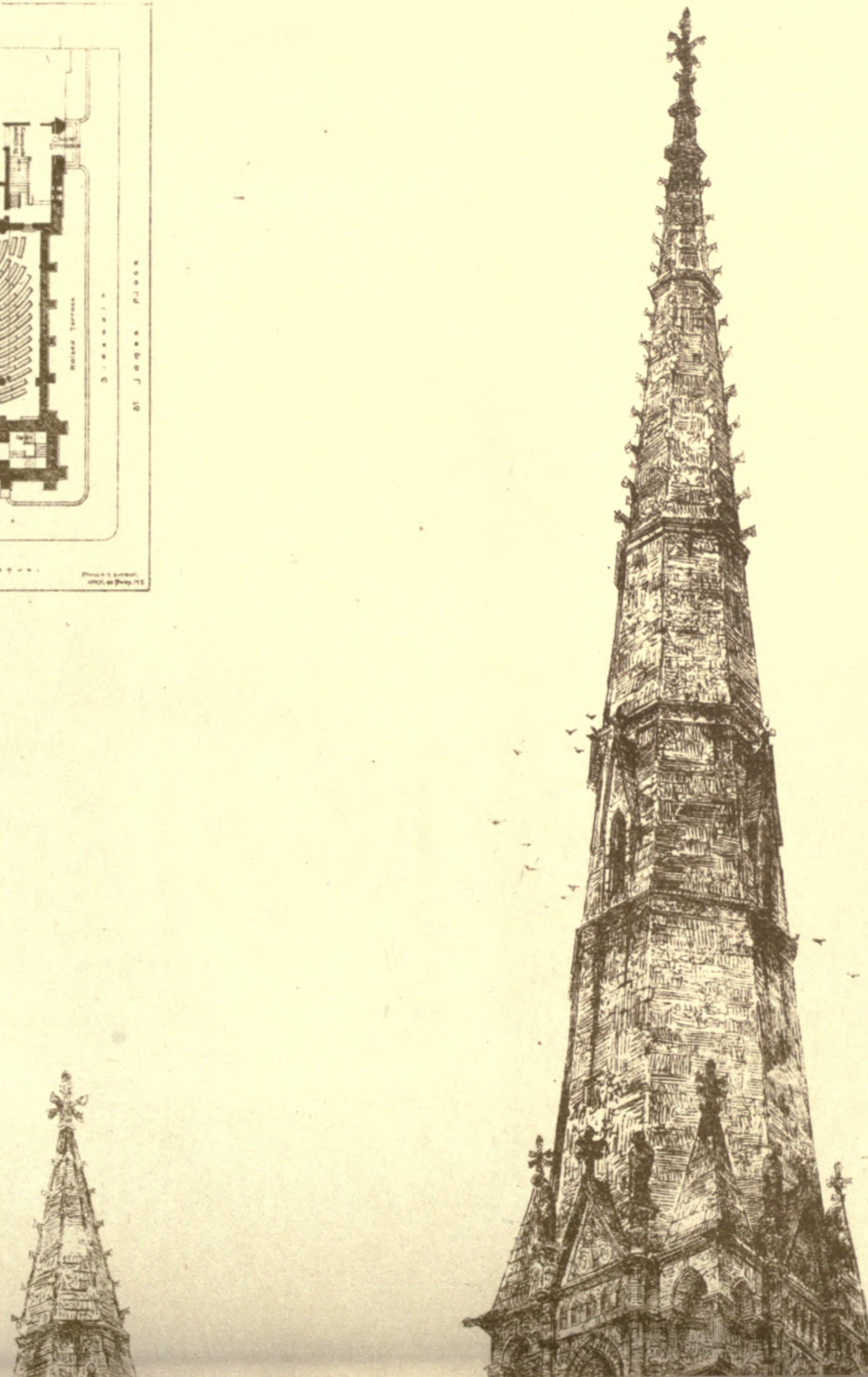
BROOKLYN·N·Y·— F·H·KIMBALL·ARCHITECT·

No. 643. AMERICAN ARCHITECT AND BUILDING NEWS, APR. 28 1888.

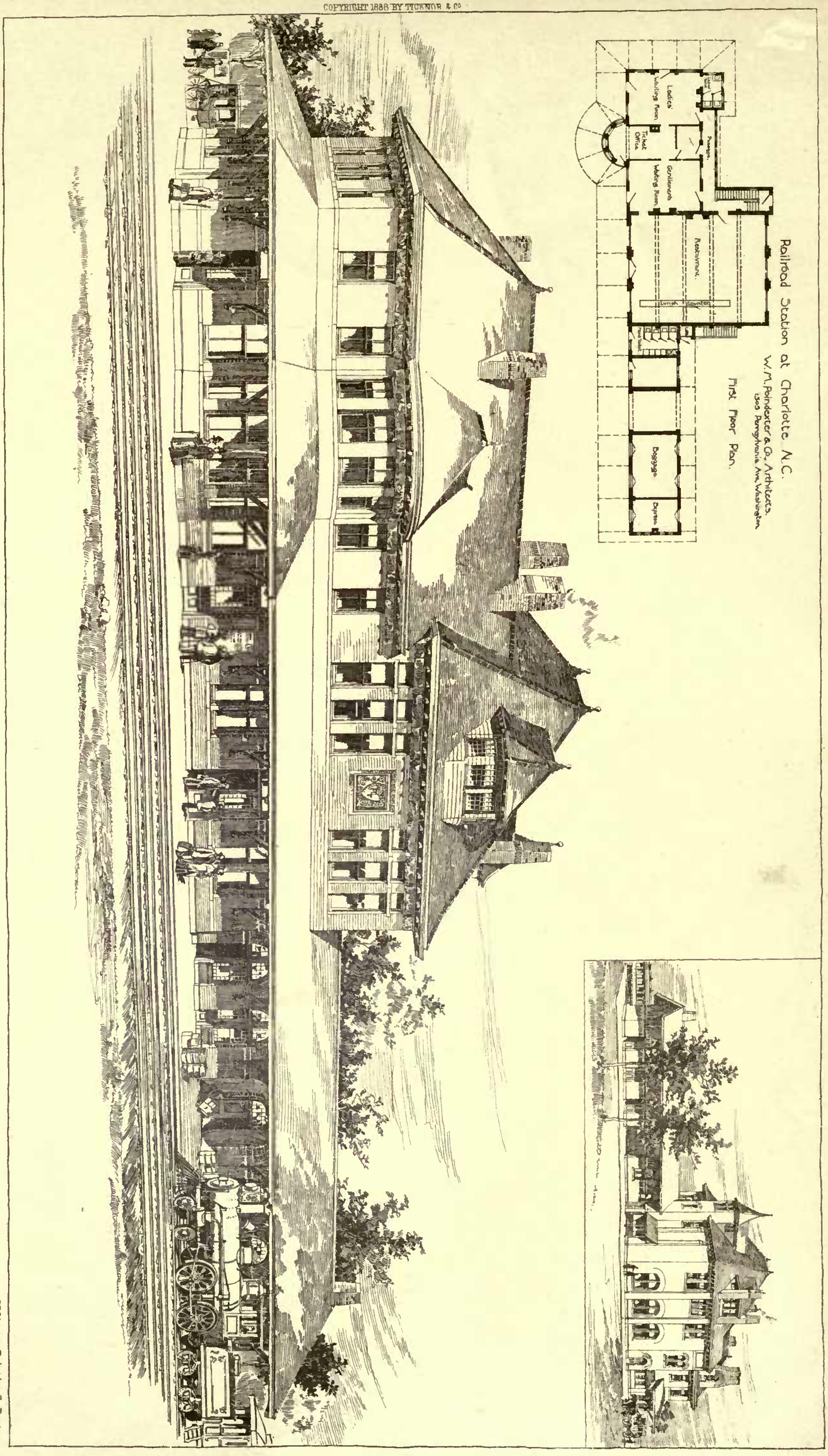
COPYRIGHT 1888 BY TICKNOR & Co







COPYRIGHT 1888 BY TICKNOR & Co.



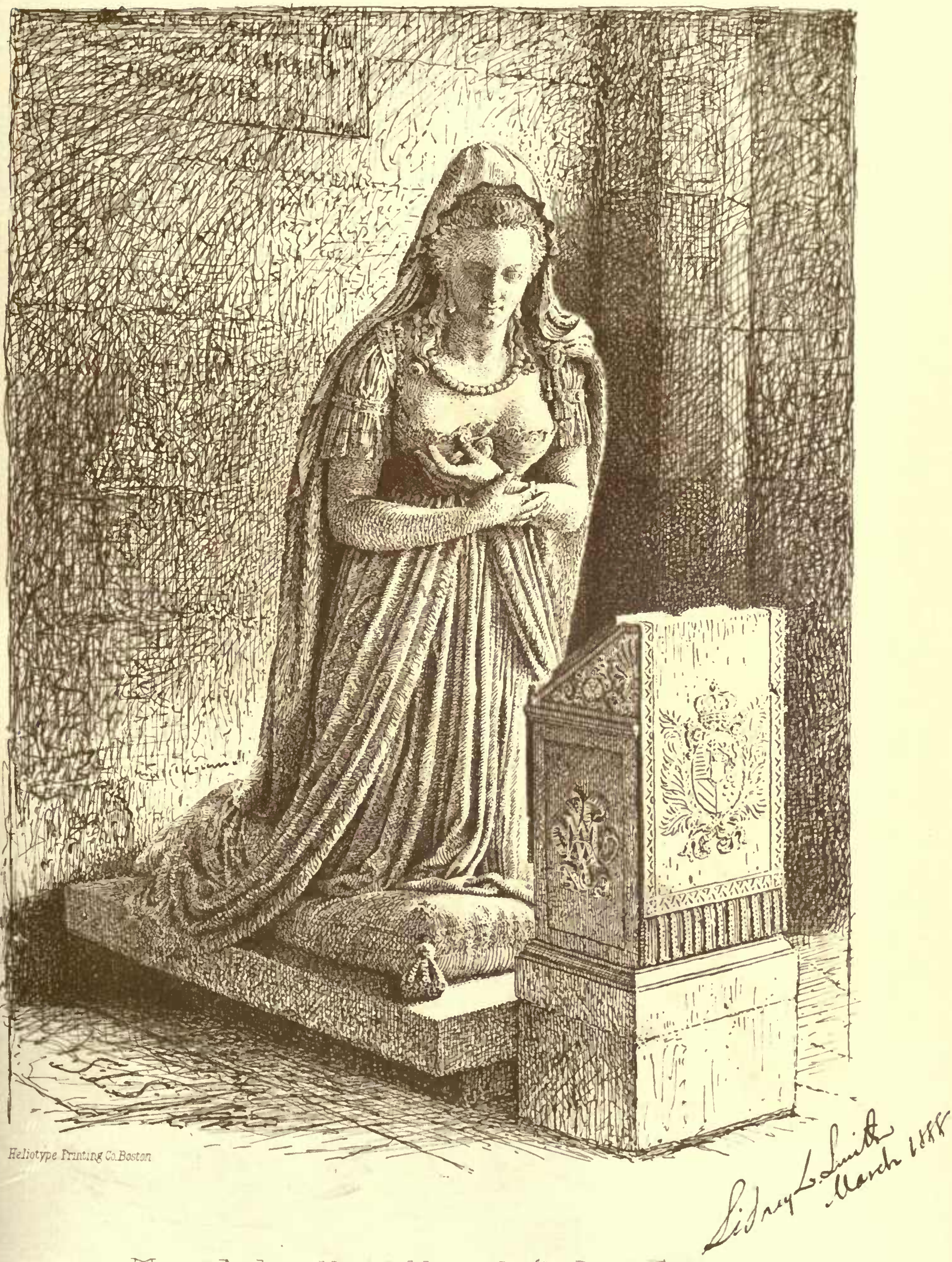
Heliotype Printing Co. Boston.

COPYRIGHT 1888 BY TICKNOR & CO

Heliotype Printing Co. Boston.

Louis Philippe and Marie Amélie
A. Mercié, Sculpter.

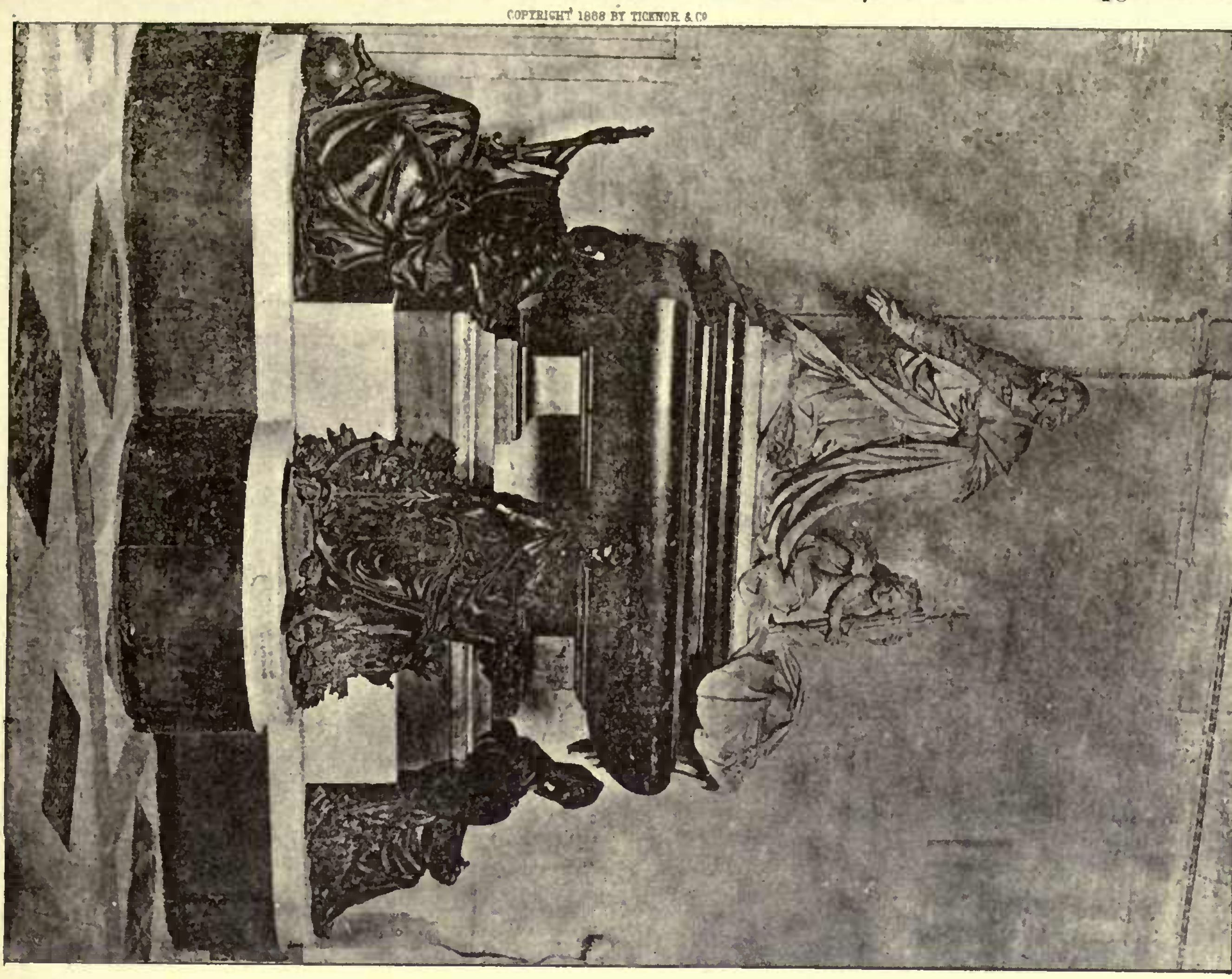
COPYRIGHT 1888 BY TICKNOR & CO.



Heliotype Printing Co. Boston

Marie Antoinette ~ Abbaye de St. Denis, France.

COPYRIGHT 1888 BY TICKNOR & CO



Tomb of Cardinal Mazarin, in the Louvre.
C. A. Coysevox, Sculptor

Tomb of Machiavelli, Santa Croce, Florence.

Heliotype Printing Co. Boston

She had a [illegible] Fredericksburg, [illegible] the [illegible] person [illegible] every day [illegible] to [illegible] She [illegible] follow her [illegible] in the [illegible] found her at work [illegible] garden [illegible]

[illegible]

[illegible] was on his way to perform [illegible] of laying the corner-stone [illegible] of one of [illegible] that Lieutenant [illegible] who [illegible] from the navy, suddenly [illegible] and pulled his nose.

The other story is that a Mr. Burroughs of New York City [illegible] Fredericksburg and being impressed with its historic associations and especially with the fact that it had been the home of the mother [illegible]

The [illegible] of [illegible] is of Ohio stone. The chapel in the [illegible] was designed by Mr. [illegible] Roberts and built [illegible] The [illegible] at the [illegible] design [illegible] the small circular church. To a certain extent [illegible] the same material used in chapels and [illegible]

The interior of the church is [illegible] the [illegible] in [illegible] and [illegible]

The ceiling of church is of wood [illegible]

[illegible] were done by Mr. [illegible]

The [illegible] French Gothic [illegible] very simple.

STATUE OF LOUIS PHILIPPE AND MARIE AMÉLIE, [illegible] MERCIÉ, SCULPTOR.

STATUE OF MARIE ANTOINETTE, AT [illegible] PAUL [illegible] SCULPTOR.

These statues and the group of Louis Philippe [illegible] [illegible] of the [illegible] and [illegible] a less pleasing [illegible] of perpendicularity [illegible]

TOMB OF THE [illegible] IN [illegible] SEVERAL SCULPTORS.

TOMB OF [illegible] IN THE [illegible] FLORENCE, ITALY. [illegible]

MR. [illegible] account of the [illegible] of [illegible] [illegible]

[illegible] AMERICAN [illegible]

The [illegible] Monument to Mary Washington [illegible]

THE parents of Washington, [illegible] were married in 1730. It is not known [illegible] tradition says that the ceremony [illegible] Both were natives of Virginia. They first [illegible] Westmoreland estate in the county of that name [illegible] been regarded as Washington's birthplace. [illegible] been burned, they removed to another estate [illegible] County, on the east side of the Rappahannock River [illegible] [illegible] Augustine Washington lived [illegible] the [illegible] April 1743, at the age of forty-nine [illegible] [illegible] the [illegible] of his [illegible] character of his [illegible] His [illegible] was that of [illegible] Ball was the second wife, [illegible] he had six children [illegible] Betty, Samuel, John Augustine, Charles and Mildred.

After her husband's death Mrs. Washington brought [illegible] direct and manage [illegible] property with admirable [illegible] Her disposition [illegible] and [illegible] her son [illegible] [illegible] Lawrence Washington said: "Of the mother I was [illegible] that of my own parents [illegible] in the midst of her children and even now, when [illegible] my locks, and I am the grandfather of a second generation, I could not behold that majestic woman without feelings it is impossible to describe." Washington treated her [illegible] with profound affection, and [illegible] the [illegible] [illegible] his letters to her, when in the [illegible] always began with the words "Honored Madam," and he was unwilling [illegible] engage in any important enterprise until he had obtained her consent. During the Revolution she removed for greater security to the town of Fredericksburg, [illegible] Washington kept her advised of the course of the struggle, and there, after several years' separation, he visited her on his return from the victory of Yorktown.

The exterior of church is of Ohio stone. The chapel in the rear was designed by Mr. E. L. Roberts, and built three or four years ago. The new work begins at the nearest chapel tower, marked by the small circular turrets. To a certain extent it was necessary to use the same material used in chapel, and follow its main lines.

The interior of the church is finished in oak, antique, the vestibule in Scotch red sandstone, oak ceiling, mosaic floor.

The ceiling of church is of wood, the facing-up of chancel and interior columns of Scotch sandstone.

The decorations were done by Mr. W. H. Day, and is one of the best examples of his work.

The style is early French Gothic, thirteenth century, tbe detail very simple.

STATUE OF LOUIS PHILIPPE AND MARIE AMÉLIE. M. J. A. MERCIÉ, SCULPTOR.

STATUE OF MARIE ANTOINETTE AT ST. DENIS, FRANCE. M. PIERRE PETITOT, SCULPTOR.

THIS statue and the group of Louis Philippe and his wife show one manner of preserving the memory of historic women, while the cut of the dishevelled and unfinished monument at the head of the article on the monuments to the memory of the mother of George Washington, which may be found in another part of this issue, shows a less pleasing manner of perpetuating a worthy woman's fame.

TOMB OF THE CARDINAL MAZARIN IN THE LOUVRE. G. COYSEVOX, SCULPTOR.

TOMB OF MACHIAVELLI IN THE CHURCH OF SANTA CROCE, FLORENCE, ITALY. INNOCENZO SPINAZZI, SCULPTOR.

MR. BARTLETT's account of the monuments and statues erected to the memory of Thomas Jefferson, suggests the exhibition in comparison of some of the monuments erected in other countries to the memories of famous statesmen.

SOME AMERICAN MONUMENTS.—I.

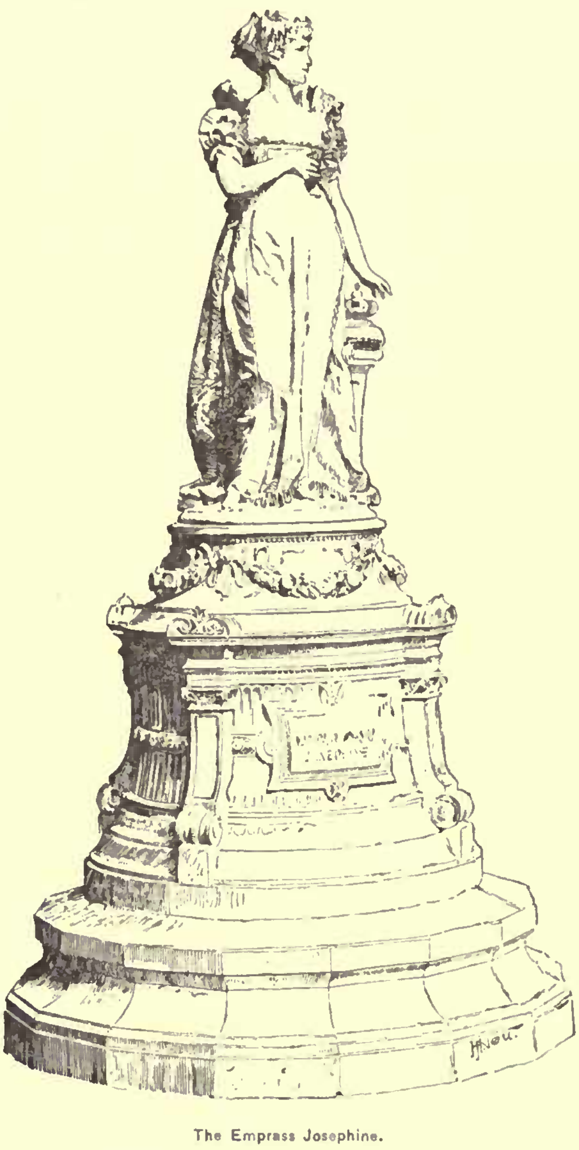
MARY WASHINGTON'S MONUMENT.

The unfinished Monument to Mary Washington, near Fredericksburg, Va.

THE parents of Washington, Mary Ball and Augustine Washington, were married in 1730. it is not known where. An unsupported tradition says that the ceremony took place in England. Both were natives of Virginia. Their first home was on the Westmoreland estate in the county of that name, and which has always been regarded as Washington's birthplace. Their house having been burned, they removed to another estate of theirs in Stafford County on the east side of the Rappahannock River, opposite Fredericksburg. Here Augustine Washington lived until his death on the 12th of April, 1743, at the age of forty-nine. He was buried at Bridge's Creek in the tomb of his ancestors. Little is known of his character or his acts. His occupation was that of a planter. Mary Ball was his second wife and by her he had six children, George, Betty, Samuel, John Augustine, Charles and Mildred.

After her husband's death, Mrs. Washington brought up her children and managed her large property with admirable sagacity. "Her disposition was kindly, just and religious; her manner dignified, reserved and sometimes, we suspect, even awful." Her stepson, Lawrence Washington, said: "Of the mother I was more afraid than of my own parents; she awed me in the midst of her kindness, and even now, when time has whitened my locks, and I am the grandfather of a second generation, I could not behold that majestic woman without feelings it is impossible to describe." Washington treated her not only with profound affection, but with the utmost deference; his letters to her, when in the public service, always began with the words "Honored Madam," and he was unwilling to engage in any important enterprise until he had obtained her consent. During the Revolution she removed for greater security to the town of Fredericksburg; there Washington kept her advised of the course of the struggle, and there, after several years' separation, he visited her on his return from the victory of Yorktown.

She had a small farm near Fredericksburg which she superintended in person, driving out to it every day in a two-wheeled chaise to direct the laborers. She employed an overseer, but he was to follow her instructions implicitly. She was a rigid disciplinarian. Both in the field and in the house her word was law. Lafayette paid her a visit in 1784 when she was seventy-eight years old. He found her at work in her garden, wearing a homespun gown and a plain straw hat over a lawn cap. She received him gaily and without embarrassment and talked with intelligence and animation of the events of the war and the prospects of the country. To the Marquis's praises of her son, she delighted him by quietly answering: "I



The Empress Josephine.

am not surprised at what George has done, for he was always a good boy." She died in 1789 at the age of eighty-three and was buried in a small cemetery belonging to the Washington family, situated in the northwestern suburb of Fredericksburg.

There are two current stories concerning the unfinished monument that stands near the cemetery. The romantic one is that a merchant of New York, who was courting Miss Custis, a granddaughter of Mrs. Washington, resolved to build a monument to the memory of the latter as a mode of showing the ardor of his affection for the former. So long as his suit progressed favorably the work went on smoothly, but the lover having finally been rejected by the fair maiden, it was unhappily abandoned. The monument stands within view of Fredericksburg. The corner-stone was laid with imposing ceremonies on the 1st of May, 1833, by President Jackson. It is built of white marble and is sixteen feet high. The block of stone, seemingly red sandstone, intended for the shaft, lies half buried in the earth near by and uncut. It is about seventeen feet long. Curiosity hunters have broken off all the edges and corners of the finished part and the irreverent marksman has dotted the surfaces with the marks of his bullets.

It was while President Jackson was on his way to perform the patriotic duty of laying the corner-stone, quietly sitting in the cabin of one of the river steamers, that Lieutenant Randolph, who had been but recently cashiered from the navy, suddenly pounced upon him and pulled his nose.

The other story is that a Mr. Burroughs of New York City, visiting Fredericksburg and being impressed with its historic associations and especially with the fact that it had been the home of the mother

of Washington and was her last resting-place, set on foot a project for a monument to her memory. It was completed to its present state and then abandoned.

From time to time a wandering tourist has called attention through the newspapers to this disgraceful example of a nation's neglect; then some one would attempt to explain why Mary Washington was so little known, and there the interest in the subject ended.

In April, 1886, the Congressional Committee on the Library considered a bill which proposed to appropriate $20,000 for the completion of the monument and for grading and enclosing with an iron fence a space of thirty-four feet square around its base, the money to be expended under the direction of the President or such officer as he may designate. The bill provided that no part of the money should be expended until the lot upon which the monument is situated shall be conveyed to the United States. And the committee recommended that the appropriation be made for the object specified when the Secretary of War shall have become satisfied that the State of Virginia has secured a valid title to the ground upon which the monument is situated, and when the State gives assurances that it will keep the monument and grounds in good repair and proper condition. What came of this proposal is not known to the writer.[1]

Mr. B. J. Lossing published in 1886 a book entitled "*Mary and Martha, the Mother and the Wife of George Washington.*" It contains a very complete collection of personal memoirs, reminiscences, minutes of conversations, and facts concerning these illustrious women, and much about the private life of Washington.

MEMORIALS TO THOMAS JEFFERSON.

Thomas Jefferson left among his papers after his death in his own handwriting an inscription in Greek for a slab designed for his wife's grave and one which he deemed appropriate for his own, with a design of the monument on which he wished it inscribed. Concerning his own tomb he wrote as follows: "Could the dead feel any interest in monuments, or other remembrance of them, when, as Anacreon says, 'we shall lie a little dust, the bones having been loosed,' the following would be to my manes the most gratifying: on the grave a plain die or cube three feet square, without any mouldings, surmounted by an obelisk six feet in height, each of a simple stone; on the faces of the obelisk the following inscription and not a word more:

HERE LIES BURIED
THOMAS JEFFERSON,
AUTHOR OF THE DECLARATION OF AMERICAN INDEPENDENCE,
OF THE STATUTE OF VIRGINIA FOR RELIGIOUS FREEDOM,
AND FATHER OF THE UNIVERSITY OF VIRGINIA.

And on the die of the obelisk might be engraved:

BORN APRIL 2, 1713. DIED ——

Because by these as testimonials that I have lived I wish most to be remembered. To be of coarse stone of which my columns are made that no one might be tempted hereafter to destroy it for the value of the material."

It is familiar to every one that Jefferson's famous and beautiful home in Albemarle County, Va., was on the summit of a little mountain, which he called Monticello, that belongs to the south-west range of hills laying east of the Blue Ridge and which rises about five hundred feet above the surrounding country. Mr. John G. Nicolay, in a recent article in the *Century Magazine*, writes as follows about this mountain home:

"He seems from the beginning to have appropriated the little mountain to himself for his own uses. Probably this feeling of personal ownership came to him even in boyhood, as by right of discovery and exploration. Tradition makes it the scene of his first and closest friendship. He and his college friend, afterwards his brother-in-law, Dabney Carr, found here a favorite oak, whose inviting shade they made a resort for pastime and study. They finally became so attached to this spot that they made a mutual promise, the survivor should bury the other at the foot of this tree, and upon Dabney Carr's early death, Jefferson fulfilled the romantic pledge. This incident is said to have originated the little cemetery on the slope of Monticello, where the dust of Thomas Jefferson now lies in its last repose."

The First Monument to Thomas Jefferson.

The cemetery was to be enclosed by a stone wall covered with evergreens and adorned with an antique Gothic temple, pedestals with urns, a pyramid of rough stone, a cascade, a grotto with a statue, inscriptions, a moss couch, a concealed æolian harp and other funereal devices, but like many other of Jefferson's princely projects, this was never carried out. Near his grave lie buried Mrs. Jefferson, their two daughters, Martha and Maria Epes, and their son-in-law, Governor Randolph.

Seven years after Jefferson's death, his grandson, Col. T. J. Randolph, erected a monument over his grave of New Hampshire granite, made after the design above described, and enclosed the yard with a stone fence. The inscription was cut on a slab of marble and set into the side of the obelisk. The graves of the other members of the family were covered with marble slabs, and the inscriptions cut upon the die of the monument.

Jefferson's democratic fancy in regard to the safety of the "coarse stone" was not a sufficient protection, for in less than three years after the structure was completed the slabs on the graves were two-thirds gone and the monument greatly mutilated by visitors who came there to the number of a thousand a year: yet the little cemetery is four miles from the nearest post-office at Charlottesville.

THE NEW MONUMENT.

In 1882–83, Mr. Manning, a member of Congress from Alabama, being detained at Charlottesville by a railroad accident, went to Monticello to visit Jefferson's grave. He was so shocked at the shameful condition in which he found it that he determined that a new monument should be made and a good fence built around it. He therefore introduced a bill asking Congress for an appropriation of $10,000, afterwards increased to $15,000, the money to be expended under the direction of Secretary Frelinghuysen.

The New Monument, designed by Col. T. L. Casey.

The Government at first proposed to limit its expenditure to the fence for enclosing the graves, but Mr. Manning insisted upon having the entire cemetery enclosed. The new monument was designed by and erected under the supervision of Col. Thomas L. Casey in 1883, and the cemetery enclosed by an iron fence thirteen feet high. The paper upon which Jefferson made his design and wrote his directions about the monument was given to the State Department by Miss S. M. Randolph, and she, with other of Jefferson's descendants, desired that the new monument should be an exact copy of the old. To their great mortification their wishes were not gratified.

It is a pity to relate that the grave desecrators of the vicinity have already begun their work and it is feared that the new structure will fare the same fate that followed the old. The chief marauders are negroes from Charlottesville and it is found impossible to punish them.

Mrs. E. W. Harrison, one of the descendants of Jefferson, writes, that the Government wished to make an approach to the cemetery from the road, and through a part of the old Jefferson estate, bought after his death by Captain U. P. Levy, and now owned by Mr. J. M. Levy, of New York City. But Mr. Levy objected, and as the United States Government is not allowed by law to expend money, except upon land owned by itself, the Secretary was obliged to restrict himself to the care of the monument and cemetery. Thus, only $8,352.83, of the $15,000, was expended. Mr. Levy himself, writes, that the work of the Government has been poorly carried out, the persons having it in charge seeming to take no interest in it, and that he is about improving the grave-yard at his own expense.

THE OLD MONUMENT IN MISSOURI.

When the new monument was in process of building, Dr. Laws, of Columbia University, Missouri, wished to get the old monument for his institution, because that State was an important part of the Louisiana purchase, made under the administration, and largely under the influence of Mr. Jefferson. Professor Fleet, who had charge of the acceptance of the monument from the Randolph family, says: "I feel that we have secured a treasure, that the old monument is much more valuable than the new—inexpressibly more precious, because of its memories, than the most costly and elegant new one that could be procured." The old monument was consequently set up in the campus of the University at Columbia.

Some doubts having been expressed concerning the genuineness of the monument and the tablet transported to Missouri, Mrs. E. W. Harrison, of Edge Hill, Va., the daughter of Mr. Thomas Jefferson Randolph, Mr. Jefferson's grandson and executor, wrote the following letter to Professor A. F. Fleet, of the Columbia University, to dispel these doubts and correct a statement in *Harper's Weekly* that the burying-ground was neglected:

"My father constantly suffered from the imputation through the public prints, that the burying-ground was neglected, when really the public was to blame. The grave-yard at Monticello, at the time of Mr. Jefferson's death, was enclosed by a double wall filled-in between with earth, in which was planted a pyracanthus hedge. This fell into decay in consequence of the crumbling of the stone-walls, and the whole was replaced in 1837, by a brick-wall, nine feet high, with stone caps on the pillars; the gates were of iron, and a grating of the same material closed an opening of eight or ten feet, left opposite the monument. It was hoped that this grating, affording a full view of the group of Jefferson graves would satisfy the public, and that they would not scale the walls. This hope proved illusive, for the slabs over Mrs. Jefferson and Mrs. Epes, which lay each side of Jefferson,

[1] In March 1888, the Committee on the Library reported this bill favorably.—Eds.

were carried off, piece by piece, till there was not an atom of them left. The slab marking Mrs. Randolph's grave was two thirds gone, when they were all replaced by the present monument, which covers the five graves of Jefferson, Mrs. Jefferson, their two daughters, and their son-in-law, Governor Thomas Mann Randolph. The locks on the gates were broken as fast as they were renewed. The grave-yard was constantly the object of care and attention of the family, but to no avail. Turf laid one month would be trodden up the next. Flowers were carried off, and the family of Jefferson felt utterly powerless to do anything for its protection. One individual, showing a piece of Jefferson's tomb, boasted that he had taken a sledge-hammer up from Charlottesville to secure it.

"The monument which was erected in accordance with Jefferson's directions, and which you now have in keeping was put up in 1833. The tablet staid in it until it became loosened by the rude treatment the monument received. Captain Uriah P. Levy, who was then owner of Monticello, discovered the insecure condition of the tablet, and kindly took it up to the house at Monticello. After he ceased to use Monticello as a summer residence, Colonel Randolph took the tablet in his carriage and brought it down to Edge Hill, where Mr. Fleet found it. It never received any injury, and was the only one which was ever cut. My father had directed the inscription to be cut on the granite, but it was too coarse to allow it. I do not know why such granite was chosen; I have the impression that it came from New Hampshire. Our Southern quarries had not then been opened. I find the date of this monument is fixed by a reference to an account of Colonel Randolph's commission merchant in Richmond, where an entry for forwarding 'a box of marble and two large pieces of granite' is made October 8, 1833. This 'box of marble' was the *first* slab placed over Mrs. Jefferson. When the brick-wall was put up, it had been all carried off, and then it was that the slabs mentioned above, which were placed over the wife and two daughters of Jefferson were put in place. They were mounted on granite, securely clamped with iron.

"The present monument was put up in 1883, and the perplexing question arose as to the disposition of the one which had rested for nearly fifty years over remains we held in such veneration. We could not leave it thrown out on the mountain-side. We did not like to bring it away, nor did we like to have it cut over to mark other graves. At this time we received through Mr. Fleet the application from the University of Missouri for it.

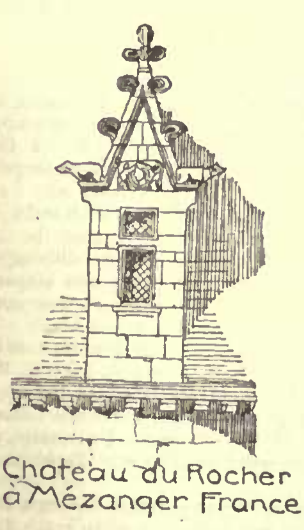
"We gladly accorded our assent to the proposition that they should become possessors of what we venerated so highly. We have never regretted the gift, and feel that in no other State in the Union would its poor, battered, weather-worn front have met with such a welcome.

"Our admiration for the State of Missouri could not have been heightened, but she has won our lasting gratitude by the veneration she has shown and honor she has done Mr. Jefferson. To us he was not alone the great man. He was to our father, a tender, loving parent, and from our earliest childhood we were taught to love him, and to venerate everything connected with his memory."

T. H. BARTLETT.

[To be continued.]

THE ART OF HOUSE-BUILDING.[1] — III.



Chateau du Rocher à Mézanger France.

IN like manner in whatever concerns the drinking-water, it is necessary to proceed with great care, and especially renounce prejudices up to this time held in honor. It is ordinarily believed that spring-water is always good. Here is an error which one cannot be too thoroughly on his guard against. Surface springs are due to the hasty infiltration of rain-water passing through layers of vegetable earth where there is abundant putrescible organic matter, which makes the water wholly unfit for domestic use. Deep springs, after being deprived of the impure matter which they hold in suspension, penetrate into calcareous cavities where they acquire ferruginous, sulphurous, iodic or calcareous properties which ought to disqualify them for drinking water for regular use. It is always prudent to have them analyzed.

Finally, the necessity in certain localities of digging wells creates evil conditions whose consequences may be terrible. Little by little there forms about these wells subterranean drainage currents which conduct towards the wells all the putrifying matter which ordinarily accumulates in the vicinity of dwellings. The currents insensibly affect a normal direction, and in excavating the ground in the neighborhood of ancient wells we find numberless ramifying channels for filth, especially in the country where the peasant accumulates manure and household refuse at a very short distance from his well. A very imperfect remedy is sometimes applied by lining the interior of the well with an impervious coating.

Infiltrations of this kind can engender sometimes most terrible epidemics. Typhoid fever and cholera are ordinarily propagated by this means when the disposition of the land lends itself to it. In France we have, amongst others, the example of the city of Auxerre, which was ravaged in 1880 by a terrible epidemic of typhoid fever. Dr. Dionis' remarked that all the contaminated quarters were furnished with water from the spring at Veau, a little commune near Auxerre. He followed the course of this stream foot by foot without finding anything suspicious, but on arriving at the fountain-head he remarked that the water sprang from a spot which was dominated by a farmer's house near which was found, naturally enough, a heap of manure. He had the manure sprinkled with an aniline infusion, and some hours afterward, in the filtering-chamber below, the water was seen tinged with red. Following up his inquiry, Dr. Dionis learned that in this house there had been a short time before a case of typhoid fever and the dejections of the patient had been thrown onto the manure heap. There was no longer room for doubt; here was the beginning of the plague.

Cholera, we can no longer doubt, also conceals its germs in impure water. The recent example of Italy and the painstaking experiments made last year by the Italian physicians prove this. Cities provided with good potable water remained unvisited. Those which took their water from an impure source were desolated by the epidemic. The few cases of cholera which are produced every year in almost every country, and to which is given the title of sporadic cholera, also are due to the foolish use of water of bad quality. Once proved that in nature it is difficult to find a source of water which presents all the guaranties of desirablo salubrity, the best thing to do is to take care to provide one's self with water scientifically good, whether it be natural or artificial.

To provide good natural water, rain-water must be stored up. This water, being really only distilled water, as the process of evaporation has deprived it of its mineral salts, without which the water is not fit for domestic use, and has in revenge saturated it with morbific particles which make it unhealthful, must, before being introduced into the reservoir, be made to pass through a layer of fine sand and fragments of marble mixed with iron ore, then another layer of quartz-pebbles and fine sand or pure silex. In passing through this filter, water absorbs mineral matter and is deprived of all the heterogeneous matters which it had assimilated during its fall through the atmosphere. The scientific detail of this operation is very minutely described in the book. In reality this only imitates by artificial mechanism means which chance employs to give us water of irreproachable purity. Whenever natural water cannot be used without danger, it does not follow that it must not be used for any purpose. It can be used for irrigating the garden, for decorative fountains and fish-ponds, since for these lesser purposes well-water is too costly because of the expense of pumping.

M. Boussard advises the system of automatic pumping invented by M. Tellier, an ingenious system which it would take too long to describe. It is enough to say that to determine the spontaneous ascension of the liquid there is needed only a roof to concentrate the heat, a solution of ammonia, and a very simple apparatus. The calorific action of the air upon the roof starts the ascending movement of the water. The cooling action of the elevated water assures the perpetuity of the movement. The heat of the air and coldness of the water, two inexpensive forces, can furnish a supply of 1,200 cubic metres an hour.

It is needless to say that the system of cisterns ought also to be rejected, not only because rain-water itself contains insufficient mineral matter, but because the roofs which ordinarily serve as collectors do not fulfil the desirable conditions of cleanliness. Romans condemned the system and Vitruvius says that cistern-water causes a hoarseness of the voice, which would be a very inconvenient thing for tenors or sopranos; but cistern-water has other defects which the Romans did not know and which modern science has distinctly catalogued.

But if we went on in this way, eliminating as we have been doing, we should run the danger of dying of thirst, seeing that natural waters which are really potable are very rarely found. The author has invented a system which makes it possible to have pure drinking water by the aid of a laboratory which forms a part of the mechanism of the kitchen of his model house. In the first place, the suspected water is distilled into steam and is then passed into a cylinder filled with compressed air, which serves in the first place to aërate the liquid, and in the second place to project it up into the reservoirs at the top of the house, where it can be distributed more easily. Before letting it pass into the pipes, it is made to pass into a second cylinder, into which are introduced powders and mineral salts in proportions which have been fixed by the family doctor, who, understanding the temperaments and habits of all the members, can regulate the proportions accordingly.

To complete this interesting study, M. Boussard advises all those who are forced either by taste or by habit to drink water, which is bad nine times out of ten, to provide themselves with a pocket filter of recent invention. This filter is so small that it can be carried in the waistcoat pocket.

Finally, by way of illustration, the author presents us, magnified to the size of a penny, the spectral images of twelve drops of water,

[1] "*L' Art de batir sa Maison*" Librairie des Imprimeries réunies, Paris. Continued from No. 643, page 190.

one of which alone is pure. The others contain the numberless terrifying types of those mysterious fauna which vegetate in these liquid depths. Here are grubs, snails, serpents and dragons, mushrooms and worms, infusoria, mysterious insects with hairy tentacles, cells where the monsters are still in formation, a repellent mass of busy animals, microbes and bacilli, each one of which bears in itself the seed of death. When one has attentively examined this plate, he understands that for any one who has to build a house the choice of drinking water for himself and his family is a question of life or death.

The nature of the soil on which the house rests also has a distinct influence on its healthfulness. During the summer the ground absorbs warmth; during the winter it parts with it. Every day the same phenomenon is produced in some small degree. We can conclude from this that at the depth of twenty metres the ground is submitted to constant oxidation which means that within this limit organic matters are entering into purification. Air, which like warmth circulates through the ground, serves as the vehicle for putrid vapors. The intensity of the phenomena varies according to the degree of permeability of the soil. Granite, basalt, metamorphic rock, schist, hard limestone, clays, fat marl and alluvial earth may be considered as impermeable. Gravel, sand and non-marly limestone, on the contrary, are permeable in a very high degree. They are, therefore, most suitable for house sites, for rain-water finds through them a normal drainage, while on impermeable soil water stands a long time unless the site is a slanting one, in which case the drying takes place naturally.

Nor ought the phenomenon of capillarity to be disregarded. Under this head we designate the facility with which liquids are drawn up from their proper level by the porosity of another body with which they are brought into contact. The walls of a house can pump the dampness from the ground on which they are planted with as much facility as a lump of sugar will soak the moisture up when it barely touches it at one corner. For these reasons the cellar and the sub-basement ought to be proscribed in well-built houses. The holes dug in the ground call thither the surrounding gases, always laden with oxidizing and putrifying elements, and through the natural suction that the warmth of the house exercises on the atmosphere of the cellars, these elements are drawn into the dwelling-rooms themselves. The cellars and store-rooms ought to be built by themselves, just as the Romans used to build them.

Sandy or rocky sites are the best for man's dwelling-house; clayey soil, on the contrary, is most unhealthy, and when one is obliged in spite of himself to build upon it, he should underdrain it in the most thorough way.

One cannot undertake the construction of a house without taking into consideration the natural ventilation through the house-walls. This ventilation is more powerful than is commonly believed. Pettenkofer made experiments which showed that the human breath could extinguish a candle by blowing through a brick-wall thirty-three centimetres in thickness. According to the most careful tabulation, provided there be a single degree's difference between the outside atmosphere and that within, there passes per hour and per cubic metre the volumes of air given below through the best known materials:

Sandstone, 1 69 cubic metres.	Limestone, 2.32 cubic metres.
Brick, 2.83 cubic metres.	Mortar, 3.64 cubic metres.

Ought this ventilation to be encouraged or checked? M. Boussard inclines to the negative, especially in small dwellings. The atmosphere deposits in the pores of the walls infecting particles which in rainy or damp weather there become putrid under the influence of the moisture. It is better to prevent this by coating the interior of the walls with plaster painted with oil-paint, varnished paper, or still better, with stucco painted in wax. M. Boussard lays down as a general rule that no one who wishes to build ought ever to attempt to do so without the advice and counsel of an architect; for the architect alone is really competent to resolve the technical difficulties and arrange processes by the aid of which can be united convenience, solidity and elegance. Even in its exterior the house ought to have an agreeable air, and the author gives a reason for it of such general interest that it must not be passed over. It must not be forgotten, says he, that a structure obstructs the view of the passer, from whom it conceals a bit of verdure, and it is not polite to compel him to gaze upon a deformity in stone. The most elementary good breeding counsels politeness toward the passer, and it is in this sense of politeness that architecture had its birth. This definition of the origin of architecture does not lack a tinge of poetry.

Beside the questions which I have just discussed, there is one the study of which is imposed on the architect, although very prosaic in its nature, for on its solution directly depends the health of the inhabitants. I mean the arrangement of the cesspools. In spite of the repugnance that such a subject inspires, it must be attacked with courage, for it is of vital importance. We know that a cubic metre of fecal matter, feces and urine together, furnish in twenty-four hours the following quantities of gases:

Carbonic acid.	315 metres, or	619 grammes.
Ammonia	149 "	113 "
Sulphuretted hydrogen . .	1.2 "	2 "
Carburetted hydrogen . .	579 "	415 "
Making	1044.2 "	1149 "

A cesspool of average capacity, or five cubic metres, furnishes then, when it is half-full, 1044.5 multiplied by 250 equals 2610 metres of infected gases at 15 degrees centigrade, and three times as much, or 8000 metres, at twenty-five or thirty degrees centigrade, every twenty-four hours.

M. Boussard is a partisan of the system first applied in England by Dr. Moule, which is also somewhat followed in America, if I am well informed. This system consists in separating the human dejections in such a fashion as to cast the solid parts into a receptacle containing vegetable earth, and where they arrive only after having rolled down a slope made of the same earth. Thus enveloped by earthy particles, the solid parts have no bad odor and no evil effect on the health. The author finds warrant for this proceeding in nature, and cites the example of the carnivora, whose excrement only amongst the mammifers contains morbific germs. The carnivora have a habit of scratching away the ground before satisfying their bodily needs, and afterwards covering their dejections with fresh earth. This example hardly impresses me: in the first place, it is only animals of the feline race which have this habit. Other carnivora, the dog, for instance, and the wolf, do not trouble themselves in this way. Cats act in this way in obedience to a need of neatness which is special to them, rather than for hygienic considerations. The system of Rev. Dr. Moule is good, not because cats scratch away the ground, but because science has been able to demonstrate that the mineralization of stercoraceous matters makes them perfectly inoffensive. The liquid portions are conducted into another conduit, where they are obliged to pass through a layer of vegetable earth, preferably garden-mould. Here is produced a curious phenomenon. The soil is populated with microbes, which, during the passage of this matter, devour all the animal particles and impurities of the urine, so that it passes from this laboratory in a state of absolute limpidity, "good enough to drink" says M. Durand-Claye, who has made a remarkable investigation into the matter. Among other things he threw a weak solution of chloroform onto this garden-mould before passing the urine through it, and he discovered in this case that the urine passed through the mould a short time afterwards came out quite as foul as it had entered. The microbes having been chloroformed, their health-creating functions had been suspended. The operation repeated at the end of a short time with the same filter without the sprinkling of chloroform gave, on the other hand, the most satisfactory results. Space lacks to describe the mechanism of these cess-pits, whose introduction has solved one of the most difficult problems of household hygiene.

I will say nothing more of what M. Boussard reports on the subject of his experiments in heating and the application of the hypocaust, as well as upon the employment of sewage for the irrigation of the kitchen-garden. On the arrangement of the hydropathic apparatus, lighting, decoration and furnishing, I am regretfully obliged to close the book, which is written with a clearness and simplicity which hides neither the erudition of the author nor the abundance of ideas. This book ought to be read not only by architects, although it was specially destined for them. Every head of a family, all those who have a house to build or to alter, all in fact who recognize the importance of the details of building from the hygienic standpoint, can read this book with profit. I will add only that this volume has been finely and brilliantly illustrated by the publishers; and while the mind finds here a good pasturage, the eye also finds its recreation.

H. Mereu.

BOOKS AND PAPERS.

JOHN BURNET, Scottish painter and engraver, was born in 1784, died in 1868.

Three thoughtful and interesting essays[1] are left us, illustrated by engravings from his own hand. Published separately in London in 1822, 1826 and 1837, they here in an American reprint become united in one volume. Hints on Composition, on Light and Shade, and on the Education of the Eye are the subjects descanted upon and illustrated. Written originally for the painter, yet the picture-maker of any sort, the art-lover, and he whose love for art is exceeded by the demands of his profession calling him to know something more of art principles, will find the book a profitable one and interesting. Were it offered the American reader at its original price, the art-student of moderate ambition, expectations and means, might, perhaps with reason, hesitate before making it his own, but when one-fourth that sum is now set as its price, and this price is one twenty-fifth of the amount necessary to purchase at present the original volumes, such hesitation is quite unnecessary. The typography of the book impresses one at first, as old in style and poor; but learning that it is a fac-simile by the photo-lithographic process, it is quickly excused and set down as quaint and interesting. The twenty-five full-page plates are well reproduced, but why the tissue sheets should cover them there seems insufficient reason, but, easily removed to the great comfort of the reader, they need not long be a hindrance to the satisfactory viewing of the plates.

[1] "*Practical Essays on Art,*" by John Burnet. Edward L. Wilson, Publisher, 853 Broadway, New York. $4.00.

SOCIETIES.

ENGINEERS' CLUB OF PHILADELPHIA.

AT the regular meeting of the Engineers' Club of Philadelphia, on April 7, 1888, Mr. Howard Murphy presented a diagram showing the results of Watertown Arsenal tests of the crushing strength of Potomac Red Sandstone and other building stones, bricks and brick masonry. The diagram shows the following:

No. of Tests.	MATERIAL.	Crushing strength in lbs. per sq. in. FROM	TO
6	Lee, Mass., Marble	20,504	22,900
10	Potomac Red Sandstone	16,625	22,102
2	Conshohocken, Pa., Limestone	14,090	16,340
2	Hummelstown, Pa., Sandstone	12,810	13,610
6	Montgomery Co., Pa., Blue Marble	9,[illegible]90	13,700
3	Philadelphia Pressed Bricks	7,210	9,050
4	Indiana Limestone	7,190	10,620
11	Philadelphia Hard Bricks	5,540	10,830
10	Ohio Sandstone	3,940	16,280
6	Philadelphia Brick Masonry in Cement Mortar	1,600	2,685
6	Philadelphia Brick Masonry in Lime Mortar	799	1,914

He also noted the other qualities of the Potomac Red Sandstone which are of special value to the engineer in construction — its durability under the action of frost, fire and wear, and its resistance to dampness.

Mr. Edward Hurst Brown mentioned that the reason the Potomac Red Sandstone was not more used for architectural purposes was that, while of a beautiful color, owing to its extreme hardness it was very difficult to dress, and also that very often in an apparently perfect stone a flaw would develop in dressing the face which would render it useless for facing-stone. He also mentioned having seen at Brentsville, Prince William Co., Virginia, an old church built of practically the same stone, taken from the neighboring Bristow Quarry, which had stood for over one hundred years, exposed to war and the elements, and which showed no signs of defects due to frost or action of the weather.

In consequence of the lateness of the hour, a communication by Mr. G. Y. Wisner, C. E., for years connected with the Lake Survey, entitled "The Physical Phenomena of Lake Harbors" was submitted by title. It shows that the progressive movement of sandy spits is attributable to the resultant waves and currents produced by the periodic oscillations of the lake surface, and that the effects are similar to those produced by the flood-tide on the Atlantic Coast, as explained by Prof. L. M. Haupt in his paper on the "Physical Phenomena of Harbor Entrances." HOWARD MURPHY, *Secretary and Treasurer.*

N. Y. CHAPTER, AMERICAN INSTITUTE OF ARCHITECTS.

NEW YORK, April 18, 1888.

To the Honorable Abram S. Hewitt, Mayor of the City of New York and Chairman, etc.

Dear Sir, — I have the honor to inform you that at a special meeting of this Chapter, held yesterday afternoon, to consider your favor of the 13th inst., the same was read, as also the resolution, therein enclosed, of the Commissioners of the Sinking Fund, requesting this organization to suggest seven persons skilled in architecture, who will be suitable members of a committee of three experts, to assist the Commissioners in examining the plans submitted for a Municipal Building, proposed to be erected in the City-Hall Park, and determining upon the award of premiums.

After discussion it was resolved to comply with the desire of said Commissioners, and to select, by ballot, architectural practitioners from the list of members of this Chapter, the seven names receiving the greatest number of votes to be transmitted to your Honor as its nominees.

The result of the ballotting was as follows, the names being arranged at once alphabetically, (except my own), and with reference to number of votes:

Messrs. R. M. Hunt, R. M. Upjohn, E. H. Kendall, N. Le Brun, Geo. B. Post, C. W. Clinton, A. J. Bloor. Messrs. Hunt and Upjohn received the highest and the same number of votes; Messrs. Kendall, Le Brun and Post, the next highest and the same number; and Messrs. Clinton and Bloor, the next highest and the same number. I have the honor to be, Very respectfully,

(Signed) A. J. BLOOR, *Secretary.*

ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.

A REGULAR meeting of the society was held April 17th, attended by fifty-six members and four visitors. The President, both Vice-Presidents, and all the Directors were present. Geo. H. Barbour and Lewis B. Fulton were elected members.

Phineas Barnes read an interesting paper on "Aluminium," the discussion of which was participated in by Wm. Metcalf, A. E. Hunt, T. P. Roberts, I. A. Beasbear and several others.

S. M. WICKERSHAM, *Secretary.*

COMMUNICATIONS.

TO REPLACE AN OLD CEILING.

BROOKLYN, N. Y., April 19, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — We want suggestions as to the best kind of a ceiling to put up in a store 25 x 150 to replace the present plaster ceiling which constantly annoys us by falling, caused by jars from overhead and old age. Are there not other substances used except plaster or wood for ceilings. CARY & STEVENSON.

[PLASTER on wire-lath would resist jarring. Duck or light canvas painted in distemper could be used. Northrop's iron ceiling could be applied without removing the present plastering, as could any of the many forms of fibre panels — leatherette, papier maché, asbestos, wood-pulp, or Spurr's papered veneers. — EDS. AMERICAN ARCHITECT.]

NOTES AND CLIPPINGS.

BURNING GARBAGE. — The Chicago *Tribune* prints some testimony as to the success of the experiment in burning garbage in that city: March 6, the garbage furnace began operations. The furnace is built up from a ledge in a stone-quarry, the flat roof being nearly on a level with the street grade. Upon this roof teams are driven, the loads of garbage are dumped into chutes running to the floor below, and through other chutes coal is dropped to bed-rock of the furnace-room, some ten feet lower. There are two furnaces in the building, but one has been found amply sufficient thus far to burn the supply of garbage furnished and without working up to its fullest capacity. There is at this season of the year little offensive odor emitted from the garbage dumped. From the great square smokestack, through which everything passes off except the ashes, no unpleasant odor has been emitted except when chicken-feathers were burned, and it does not require the evidence of a sanitary expert to prove that this is not unhealthy. Assistant Health-Commissioner Thompson said they were now cremating about fifty tons, or yards, per day, and could just as well burn three times as much. "The works are perfectly satisfactory," he said, "and meet our expectations save in the matter of fuel. It was originally estimated that only about four tons of soft coal would be required per day to run the furnaces to the limit of capacity. I am now convinced that it will require from seven to eight tons per day. The amount of fuel used depends largely on the quality of the garbage. If we are trying to burn potatoes and turnips which have been spoiled on some dealer's hands, as they contain from eighty to ninety per cent. of water, an intense and protracted heat is required. On the other hand, dead dogs and cats, etc., contain enough carbon to burn themselves up and something else besides, provided they are encouraged. The cost will be less in summer than winter, because the garbage will be more inflammable. We started out with the idea of erecting furnaces of sufficient capacity to consume all garbage collected from the West Side, and I think we have that capacity. But we found that the South Water Street merchants were constantly having large quantities of decaying vegetables on their hands, often offensive, which they had great difficulty in disposing of in any sanitary way, and as we had ample capacity we determined to come to their relief, and have done so. During cold weather we could not get any considerable portion of the West Side garbage to the furnace in a suitable condition for combustion. Garbage, ashes, cinders, oyster-cans, beer-bottles, and old clothes, were heaped up and frozen into a solid mass, so that they could not be separated. Warmer weather will change these conditions, and when it shall have been made possible to gather the refuse of the entire West Side to the crematory there will be little chance for South Water Street. I have had two or three complaints about odors from the stack. I investigated one of them and found that the furnaces had not been running during the days complained of because there was no material on hand. The complainant was simply mistaken."

AN AUTOMATIC FIRE-ESCAPE. — The prospects for a new opera-house at Norwich, Ct., being encouraging, the *Norwich Bulletin* offers the following suggestions:

From the spectator's standpoint, the three essentials of a good opera-house are ease of access, a clean, commodious, comfortable and well equipped auditorium to sit in and stage to look at when one has entered, and the best facilities for egress. Sometimes the most admirable feature of an opera house, like the most pleasing characteristic of some cities, is the ample facilities for getting away. The recent disastrous fires in the theatres in Paris, Exeter and Oporto, not to mention the Brooklyn and other fires in this country, have demonstrated the necessity for large means of escape in cases of emergency. Even in theatres provided with fire escapes, lives are often lost in consequence of the panic, in which people lose their senses. This suggests that there is a grave defect in the fire-escape system which requires any volition or thought on the part of the audience, and there occurs to us only one way of avoiding this danger. It is to have individual fire-escapes, one for each opera-chair, which will work automatically. The modern type-setting machine may afford a helpful hint to the designers of the new opera-house. The types are arranged in compartments at the top of the machine. From each compartment descends a little channel, the channels gradually merging until they come to a focus at the point where the types are delivered. The types are released by operating upon keys like a type-writer, slide down through the channels, land on end

right side up, and are shoved along in a row with great speed, regularity and precision. Here we have the germ of a new fire-escape system. The seat of each chair should be made to swing downward as well as upward, and underneath it should be a trap-door opening into a safety chute. These traps may be sprung singly at the option of the occupants by stepping on electric buttons, such as are placed in the floor under dining tables, or may be operated all at once from a central point. The chutes will converge at an opening on the sidewalk at the side of the opera-house. It may be desirable to have separate deliveries from the 75 and 50 cent seats, so that the 75-centers will be discharged on one side of the building, and the 50-centers from the other. If this system should be adopted, great care would have to be used to prevent the system from going into operation when it was not needed. It would be surprising to Henry Irving and Ellen Terry, for instance, if, in midst of one of their most artistic scenes, somebody should touch the central button and the whole audience should sink through the floor out of sight. It would also somewhat astound an innocent pedestrian, who happened to be passing one of the delivery exits, to see, without the slightest warning, a stream of humanity fired out through a hole in the side of the building with a little more regularity than corn-cobs from a sheller. But with a little precaution, no trouble of this sort need occur. It must be evident that this system is superior to all others in existence, and that eventually it will be adopted by all the best theatres in the country, among which, it is to be hoped, the new Norwich Opera-House will rank.

The Sigiri Rock at Ceylon. — For the first time for a number of years the Sigiri rock in Ceylon has been scaled by a European; the feat on this occasion being performed by General Lennox, who commands the troops in the island. It is said, indeed, that only one European, Mr. Creasy, ever succeeded in reaching the summit. The rock is cylindrical in shape, and the bulging sides render the ascent very difficult and dangerous. There are galleries all round, a groove about four inches deep being cut in the solid rock. This rises spirally, and in it are fixed the foundation bricks, which support a platform about six feet broad, with a chunam-coated wall about nine feet high. The whole structure follows the curves and contours of the solid rock, and is cunningly constructed so as to make the most of any natural support the formation can afford. In some places the gallery has fallen completely away, but it still exhibits flights of the fine marble steps. High up on the rock are several figures of Buddha; but it is a mystery how the artist got there, or how, being there, he was able to carry on his work. The fortifications consist of platforms, one above the other, supported by massive retaining walls each commanding the other. Owing to the falling away of the gallery, the ascent in parts had to be made up a perpendicular face of the cliff, and General Lennox and four natives were left to do the latter part of the ascent alone. The top they found to be a plateau about an acre in extent, in which were two square tanks, with sides thirty yards and fifteen feet respectively in length, cut out of the solid rock. A palace is believed to have existed on the summit at one time; although time, weather and the jungle, have obliterated all traces of it. During the descent the first comer had to guide the foot of the next into a safe fissure: but all reached the bottom safely in about two and a half hours.— *St. James's Gazette.*

The Air of Edinburgh Theatres. — An interesting account has been given by Mr. Cosmo J. Burton of the amount of carbonic acid and organic matter in the Theatre Royal and Royal Lyceum Theatre of Edinburgh. At the time of the experiments the theatres were by no means full: nevertheless, the temperature was from ten to fifteen degrees above that recorded immediately before the houses were opened, while carbonic acid was multiplied from three to five times. Mr. Burton remarks that the vitiation of the air proceeds with extraordinary rapidity at first but the rate of change soon decreases, till towards the end of the performance the air becomes little or no worse, and, indeed, in a few instances it appeared to slightly improve. The atmosphere of all parts of the theatre was not equally vitiated; the air of the gallery was considerably worse than that of any other part of the house; the amphitheatre, dress-circle, and pit did not come in the same order as to degree of impurity in the experiments, but the pit was always worse than the dress-circle. The late Dr. Parkes stated that headache and vertigo are produced when the amount of carbonic acid in the air of respiration is not more than from fifteen to thirty volumes per 10,000, and our experience of some theatres leads us to suspect that Mr. Burton's results are not special to Edinburgh. The facts as to all theatres ought to be known; for the public had much better lose an evening's enjoyment than submit to the enforced inhalation of a polluted atmosphere for a number of hours.— *The Lancet.*

The Monument to Mozart at Vienna. — "Readers may have noticed in recent news from Vienna," says the London *Musical World*, "that the prize model for the Mozart monument to be erected in that city has, after further consideration, been rejected; one, and not the least important, reason being that Vienna has already two sitting musical heroes in Beethoven and Schubert. A fresh competition has therefore been decided upon, leaving the committee pro tem. without a model, without a suitable spot (to be chosen anew to suit the new design), minus about £480 paid for three rejected prize models, and only about £4,000 cash in hand, and with the realization of the scheme relegated to a somewhat more distant future. This is much to be regretted, especially as the Viennese, with all their genuine admiration and love for the great Salzburg composer, have an omission to repair. For not only is Mozart's grave unknown, but the numerous houses where he lived and wrote some of his greatest works remain, with the two exceptions to be mentioned later on, unprovided with any memorial tablets, or other tokens to indicate the fact. It is true that the use of such tablets on private houses is of comparatively recent origin, but of late this praiseworthy custom has become pretty general in most European countries, more particularly in Italy, where not only native, but also foreign genius is honored in this way. Thus, for instance, in the Corso at Rome, the inscription may be seen, 'Here lived Wolfgang Goethe, and wrote immortal works.'"

Van Beers and His Alleged Works. — Jan Van Beers, a Belgian painter in Paris, has got himself into trouble by a misplaced regard for his reputation. He brought action against an Ostend dealer for having on sale pictures signed by his name which he declared he did not paint. It came out on trial that he habitually put his signature on copies of his pictures made by pupils, and also touched up their originals and signed them; and even that an association had been formed in Paris to manufacture his pictures. He himself was obliged to admit these facts, while he insisted that the four pictures of the Ostend dealer were not from the factory, but were real counterfeits, so to speak. The public prosecutor, however, dropped the suit, and all Van Beers gets by his motion is a world-wide extension of his fame, with a flaw in it. The morality that was good enough for Rubens won't do in this age. A good many works supposed to be by Van Beers are owned in this country, by the way. — *Springfield Republican.*

TRADE SURVEYS

Commercial and manufacturing interests are endeavoring to explain the causes and measure the extent of the present depression in prices, with a view of forecasting business probabilities for the last half of the year. The moment the most careful writer steps beyond a connected statement of all the facts bearing on the situation, so soon does he step into marshy ground. When all the facts are hammered with a pestle, the resultant product is a strong probability that trade and manufacturing conditions instead of getting worse will get better. In arriving at this conclusion, it is necessary to leave out of account the artificial depression in stocks, although just at present there is a greater demand for than supply of first-class railway securities, and a still better demand is predicated on the fact, if it is a fact, that the future heavy bond-purchases by our Government, and the decreasing of the rate of interest in Great Britain, will increase the volume of employment-seeking capital and thus boom stocks. The theory is fine, but stock predictions too frequently turn out wrong. The more fruitful field for intelligent opinion and better comprehension of trade tendencies is to be found in the interior among manufacturing, railroad-building, and other great but secondary interests. The patent facts to-day are these: Enterprise is more circumspect in the West, more feverish in the South, values are declining and the supply of products is nearly equal to demand, as to producing capacity. Production is restricted very widely. This is notably the case in the iron trade. Railroad equipment concerns, from locomotive-makers down, are all busy. Lumber manufacturers are crowding ahead East, West and South, as though the markets were bare of stocks. Coal production is gaining on last year notwithstanding the supposition of lessened industrial activity. Furniture manufacturers have done fully as much work this year as last. The carriage and wagon-makers predict as much business. Builders are undecided. In New York, a rather general falling-off of work is complained of. In Philadelphia, architects say they started out with considerable work, but new work is slow. In Chicago, this year's plans have been interfered with by a number of influences. In the Northwest a great deal of building will be done, as much as last year, probably, and throughout the prairie States. According to advices from Chicago lumber, iron, glass and other interests, there will be more building done in city, town and country. Even the rail-makers are not willing to admit that the conclusions reached by one or two guessers, that only 8,000 miles of road will be built this year, are correct. They say the emergencies have not arisen which are to determine the course of builders. This is correct. There are schemes on foot at this time among American and foreign financiers, which, if successful, will most probably result in the immediate prosecution of three or four important railroad-building enterprises in the West and Southwest, as well as in the South. From this summary of ascertained fact the influence is fairly deducible that a healthier industrial activity is probable during the last half of the year, leaving out of account stock speculations and surprises. The American notion is that unless manufacturers have from three to six months' work booked ahead at high prices, that the country is on the road to destruction. The downward tendency in prices will continue in spite of all manner of trade combination. Even the copper-trust, which has carried away this year forty million pounds of refined and crude copper in order to enhance values, has difficulties to encounter that jeopardizes its ultimate success in cornering the world's supply. The race which capital and enterprise and productive capacity are each and all running, must be productive of good results when they have fully formulated themselves. The industries will soon be freed from threatened tariff reductions, but the results of the coming campaign will warn manufacturing interests to put their shops in readiness for a general and moderate reduction of duties. The disbursements of capital at home and abroad, the possibilities of foreign war, the extremely low prices of raw resources throughout the United States all point to the greater activity in American financial circles, and the steady employment of labor in the newer States. The country will surprise itself in its ability to endure without the support of all of the four thousand little tariff props on which it has rested for so many years. Much of the caution displayed by long-headed enterprise, and what we mistake for fear, is due to the underlying conviction that a rearrangement of our fiscal affairs is an early probability. The bugbear of labor strikes is disappearing. The evils that trade combinations seemed to threaten a few months ago are not so great as depicted. The ability of the country to shut down brakes has been demonstrated. The dangerous real-estate speculation in the West has been checked. The borrowing West will continue to borrow, but will not get beyond its paying ability. A multitude of new interior markets are springing up, and builders and architects, especially in the West, see grand opportunities in the near future for building enterprise. This diversification of the industries is the secret of the great activity of the next few years. The managers in many of our great industries give utterances to convictions of the certainty of great building activity in the near future. The steadiness of wages, the greater assurance of constant work and the growth of desire to be somebody, are all contributing to make the laborer a worker for a home, and this tendency is being stimulated by the wonderfully rapid growth of building and loan associations, and by the liberal policy of money-lending agencies throughout the newer sections of the country.

S. J. Parkhill & Co., Printers, Boston.

Copyright, 1888, by TICKNOR & Co.

HELIOTYPE PRINTING CO. BOSTON.

EMANUEL BAPTIST CHURCH, BROOKLYN, N. Y.
FRANCIS H. KIMBALL, Architect.

THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. XXIII. Copyright, 1888, by TICKNOR & COMPANY, Boston, Mass. No. 645.

MAY 5, 1888.

Entered at the Post-Office at Boston as second-class matter.

CONTENTS

THE important competition for the criminal court-building and record-hall in New York has had a singular result. It will be remembered that the local bodies of architects almost unanimously condemned the terms of competition, but a considerable number of drawings was received, which are, we believe, still under consideration by the judges. Meanwhile, however, a bill was introduced in the New York State Legislature, which has just been unanimously passed, absolutely forbidding the erection of either of the proposed buildings in the place assigned by the terms of competition, so that the costly contest will, apparently, have no practical result. It is only fair to the New York municipal authorities to say that they seem to have intended to make their terms of competition acceptable to architects, so far as they could without committing themselves to the actual erection of the buildings, about which they probably felt an uncertainty; but now that the Legislature has converted the uncertainty into a positive prohibition, it will occur to a good many people that the whole affair would have presented a better appearance if the matter of the site had been settled before any further steps were taken, so that architects might have been invited to compete by the only inducement which will tempt the better class of them, the definite promise of the execution of his design, at the usual remuneration, to the author of the best plan. The next thing for the city to do would seem to be the selection of a new site, more acceptable to the Legislature, for the buildings, which have become very necessary to the municipal business. As the legislative bill forbids their erection on any part of the City-hall Park, and as it is desirable that they should be in the neighborhood of the present City-hall and Court-house, the requirements can hardly be fulfilled without condemning private land in the vicinity, and clearing it. As all the land near is covered with very costly buildings, the expense of a suitable site will be enormous. The *Mail and Express* suggests that the estates on the west side of Broadway, between Warren Street and Park Place, should be taken, leaving communication between Murray Street and Broadway by a large arch, and on the whole, although rather startling, this seems to us about as judicious a plan as is likely to be proposed. Although the Broadway land is probably more valuable than that on the other sides of the City-hall Park, the buildings on the portion to be taken are not so costly as the enormous office-buildings on the other sides of the Park, while the convenience and magnificence of the Broadway site are worth a considerable additional cost. With the arch, forming the terminus of Murray Street, somewhere in the middle of a façade five or six hundred feet in length, an effect would be obtained which would be conspicuous for a long distance in three directions, and would represent, as nothing in New York, except the Central Park, now does, the greatness of the first of American cities. If we had our way, perhaps, we should clear the whole end of the island, south of Rector Street, and build a splendid group of municipal buildings, which should not only form a worthy termination to all the railway lines, but should present to persons arriving by sea the most splendid architectural scene in the world; but as there is no probability that a building on which so many millions were lavished as the County Court-house would ever be moved or abandoned, no doubt the *Mail and Express's* scheme is the best suited to the circumstances.

THE case of Holy Trinity Church in New York, which has been arraigned for violation of the Foreign Contract Labor law in calling an English rector to the parish, is now on trial in New York. Of course, the question to be tried is simply whether the law applies to the hiring of clergymen, as well as of spinners and foundry-men, and the opinion of the judges will be of considerable interest, particularly as a somewhat similar case was recently tried in California, where a Chinese professor, who had been appointed, was held not to be liable to the operation of the law, which, it was there said, was obviously intended to apply only to manual laborers. We imagine that the New York courts are rather slower than most others to discover "obvious intent" in statutes which cannot be interpreted by the aid of the dictionary; and as the law expressly exempts from its operation "professional artists, actors, lecturers and singers," the presumption is that it intended to exempt no other persons; and clergymen being neither artists, actors, lecturers nor singers, the unavoidable inference is that they are not exempt from its operation, as it now stands, however disposed counsel or judges may be to correct and amend it on their own account, by supplying such "obvious intents" as may suit their varying ideas of expediency. In point of fact, as the United States District Attorney in the case well remarked, the law, as passed, was a crude and contemptible electioneering device, put forth with the idea of catching the votes of labor agitators, and enacted by the votes of Congressmen who, apparently, never read anything of it beyond the title. For all that, however, it is the law of the United States to-day, and if we choose to elect Congressmen who pass laws of that sort, the best thing that the courts can do for us is to see that they are literally and strictly enforced.

WE commend to the citizens of the many towns, particularly in the Eastern States, which refuse year after year, to take the simplest measures for preventing pollution of the soil by increasing population, or to pay the slightest attention to any other measures of hygiene, the example of some inhabitants of Winthrop, Mass., who, having petitioned and agitated for years in vain for the adoption of some system of sewerage in the most thickly settled portion of the place, have now caused a bill to be introduced in the Massachusetts Legislature, under which the sluggish municipality is to be required to furnish within twelve months the sewerage asked for, with the alternative, if the order is not complied with, of having the work done under direction of the State Board of Health, at the expense of the town. There is said to be no doubt that the bill will pass the Legislature, and Winthrop will have to make itself partly clean, whether it wishes to do so or not. It is much to be hoped that the example will be followed by the residents of many other small New England cities. Curiously enough, the inhabitants of these communities, though very heavily taxed, get less for their money in the way of decency than any others in the United States. It has long been the fashion in New England to satirize the neglected, shabby look of Southern towns; yet there are few Southern towns which do not show more solicitude for public health, and more efficiency in providing for it, than some New England cities of twice the population, and five times the wealth.

AMONG the best trained and most artistic English architects, no one will be more seriously missed and more deeply regretted, than Mr. W. Eden Nesfield, who died a few weeks ago, at the age of fifty-three. Most of us are familiar with Mr. Nesfield's beautiful book of sketches from the Continent, which was published some fifteen years ago, at the same time with a similar book by his intimate friend and associate, Mr. Norman Shaw. Of the two books, perhaps Mr. Nesfield's was a little the more beautiful, but the talent of the authors ran in directions very similar, and their work, on commencing practice, showed very much the same common sympathy. Like the late William Burges, however, Mr. Nesfield possessed an independent fortune, and, not being obliged to exercise his gifts for a livelihood, and being also very averse to professional notoriety, or "advertising," as he called it, his buildings are not very numerous, and are little known. Of late years, says the *Builder*, he had practically retired altogether from professional work, and had devoted himself to painting, which he considered the means of artistic expression most suited to him. Most people will think that the great capacity for artistic expression in stone and timber which he possessed was too rare a gift to be abandoned, but it is hardly to be wondered at that a man of sensitive disposition, with the means of pleasing himself in the matter, should be glad to give up the annoyances and anxieties of architectural practice for quiet work at his easel. In private life Mr. Nesfield was always kind and helpful to his brother architects, and his name will be long cherished in the profession in England.

THE project for a great Episcopal Cathedral in New York is developing rapidly. The splendid site on Morningside Park has been secured, and arrangements have been made for obtaining preliminary designs. According to the New York *Times*, an "architectural expert" has been in correspondence with "architects of renown" in all parts of the civilized world in regard to plans, while the Trustees, according to the same journal, find themselves embarrassed by the consideration that "in the Middle Ages men of genius devoted their entire lives to the building of the great cathedrals," receiving for the sacrifice "a moderate compensation, if any," and that at the present time the men of genius are busy building "railways, bridges, bank buildings and life-insurance buildings," that pay them much better than the Cathedral Trustees can afford to. The *Tribune* reporter seems to have found a Trustee in a more cheerful mood, for his account makes no mention of the very unfounded notion that the mediæval architects devoted their lives to one building, or that they were poorly paid for their work, and says that within a week or so invitations will be sent out to the leading American architects for sketches, two of which are to be selected "as a basis to work on." Just what this means we cannot imagine, but suppose that the circular, when it appears, will throw some light on the subject. Another interesting piece of news is that Trinity School is to purchase a portion of the Cathedral plot, and erect its buildings in connection with those of the Cathedral. If, as we hope will be the case, the school buildings are to be joined in the same design with the Cathedral, a very effective group might easily be made. As the school has a large endowment, this portion of the structure can be built as soon as the ground is clear. The Cathedral, however, is likely to be a longer affair, and it is proposed to build the choir first, consecrate and use it, adding the rest later, as has been done at St. Thomas's, in New York, and several other parish churches, to say nothing of such examples as the Cathedrals of Cologne and Beauvais.

A CASE was recently tried in England involving the responsibility of contractors, which we find reported in the *Builder*. The Messrs. Peto Brothers, very eminent builders in London, had a contract for the erection of a hotel in Covent Garden. In carrying out their contract, they were obliged to excavate about nine feet below the foundation of the wall, between the hotel and the adjoining house and underpin the wall. In doing so, the wall was cracked from top to bottom. The owner of the adjoining estate sued the Messrs. Peto for damage to his wall. The contractors resisted on the ground that the work which they had done was carried out under the provisions of the Metropolitan act, and that the settlement and cracking of the superstructure was an inevitable consequence of the underpinning, and they argued that the work having been done in accordance with the statute, no one could be held liable for the result of it; that if any one could be held liable, it was the owner of the building they had constructed and not themselves, and finally, that the work had been carried out with the utmost care, and that, as the cracking was unavoidable under any circumstances, there had been no negligence involving anybody's responsibility. The defendants did not call any witnesses to prove their assertion that the cracking of the wall was the necessary consequence of underpinning it, and his lordship, the judge, remarked that if all the builders in London had come and said so he should not believe them. In his opinion there had been very considerable negligence. He was sure that the settlement was not the inevitable result of the work done, because he had himself seen a wall underpinned without producing any cracks, so that the damage not being the necessary consequence of work done according to the statute, the defendants could not use that for avoiding their responsibility, and for much the same reason, the burden could not be shifted on the shoulders of their employer. No one remained to bear it except the builders, and the judge condemned them to pay the assessed damage to the wall, about two hundred dollars, with two hundred and fifty more as consolation to the owner of the injured house, and the costs of the suit.

THE *Sanitary News* contains an interesting article on cottage construction by Mr. J. Corbett, the author of a prize essay on the best means of providing dwellings for the poorer classes of Central London. According to Mr. Corbett, the best models for English cottages are to be found, like those for more ambitious dwellings, among the structures of a past generation, perhaps of the Elizabethan age. In his perfect cottage there should be no shabby imitation of a superior architecture, no fragile iron or slender woodwork, no weak and diseased plastering, creaking and shaky floors, or concealed hollow spaces for the accommodation of dust and vermin. He would have his little house plain and simple, but substantial in every detail, dry, sunny and clean. To secure this the walls should be faced with hard-burned bricks, not disposed to absorb water, or, if these cannot be obtained, the outside should be treated with two coats of boiled linseed oil, laid on hot at a season when the walls are dry, or washed with two coats of thin Portland cement, tinted, if desired, to any required shade. As an additional protection against dampness, the inside should be plastered directly on the brickwork with cement instead of lime-mortar, and the roof should overhang the walls at least one-twentieth of the height of the walls. This amount of projection, according to Mr. Corbett, will keep about nine-tenths of the rainfall from reaching the walls. For floors in rooms so small as those of cottages, where the span seldom exceeds twelve feet, he would use solid planks, three or four inches thick, tongued and grooved or splined together and bolted through. The ends of the planks would rest on projecting courses of brick arranged for the purpose, and the crevices between them and the walls should be filled up with cement. In Mr. Corbett's opinion, such floors would be more sound-proof than the ordinary hollow flooring. We may be permitted to doubt this, but they would certainly be very substantial and durable and, in consequence, architecturally satisfactory. In the vicinity of large manufactories he would provide for supplying a limited amount of steam to each cottage, introducing it between the double walls of an oven in such a way that in cold weather the radiation from the oven would warm the room in which it stood, while the interior of the oven could be utilized at any moment for warming a breakfast, cooking a dinner, heating water for bathing, or disinfecting clothing. This seems to us an excellent suggestion. One of the most sensible men we ever knew once remarked to us that intemperance among the poor was chiefly due to dyspepsia. They had to live on cold, indigestible food, which kept their stomachs disordered, and, through the well-known sympathy between the stomach and the brain, the pangs of imperfect nutrition engendered a melancholy and uneasiness which craved alcohol for temporary relief. There is certainly a good deal of reason in this, and an arrangement so simple as that described by Mr. Corbett, which might be provided for an entire factory village at small expense, would secure warm, well-cooked breakfasts and suppers for the men of the little households, which would send them off to their work in the morning in a comfortable frame of mind and body, and would attract them home at night, without overtaxing the strength of the mothers, already tired, perhaps, by the care of a nursing baby and two or three other children.

SAFE BUILDING. — XXV.[1]

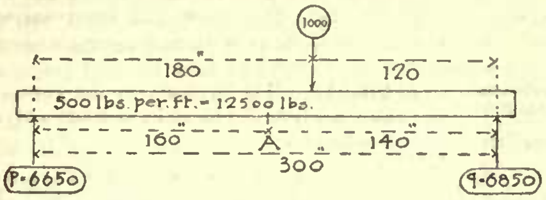


Fig. 148.

Explanation of Tables XIX to XXIII. TABLE XIX gives all the necessary data in regard to the different shapes of wrought-iron and steel I-beams, and Tables XX, XXI, XXII, and XXIII of channels, angles, tees, etc., which are rolled. The sections selected are those of the New Jersey Steel and Iron Company. The sections of the other companies are essentially the same. The strengths of some of the I-beams and channels of this Company, however, are a trifle stronger and stiffer than those of some of the other companies, as they are a fraction of an inch deeper, though of the same weight and area of cross-section. **I-sections not economical.** It should be remarked that except in the case of the simplest kind of beam work, it is cheaper to frame up plate girders, or trusses of angles, tees, etc., as there is a strong pool in the rolling of I-beams and channel sections, which keeps the price of these two sections unreasonably high, in proportion to other rolled sections. Steel beams and sections are sold as cheap as iron, (they are really cheaper to manufacture), and where their uniformity can be relied on, should be used in preference, as they are much stronger and also a trifle stiffer.

One example of an iron beam will make the application of the Tables to transverse strains clear, and help to review the subject, before taking up the graphical method of calculating transverse strains.

Example.

Use of Table XIX. *A wrought-iron I-beam of 25-foot clear span, carries a uniform load of* 500 *pounds per foot including weight of beam; also a concentrated load of* 1000 *pounds* 10 *feet from the right hand support. The beam is not supported sideways. What size beam should be used?*

The total uniform load $u = 500.25 = 12500$ pounds of which one-half or 6250 pounds will go to each reaction; of the 1000 pounds load $\frac{180}{300}$ or 3-5 will go to the nearer support q (Formula 15), therefore

$$q = 6250 + \tfrac{3}{5}.1000 = 6850$$

Similarly we should have (Formula 14)

$$p = 6250 + \tfrac{2}{5}.1000 = 6650$$

As a check the sum of the two loads should $= 13500$, and we have, in effect:

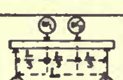
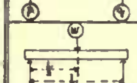
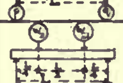
$$6850 + 6650 = 13500$$

To find the point of greatest bending moment begin at q pass to load 1000, and we will have passed over ten feet of uniform load or 5000 pounds, add to this the 1000 pounds making 6000 pounds, and we still are 850 pounds short of the reaction, we pass on therefore towards p one foot, which leaves 350 pounds more, and pass on another 7-10 of a foot (to A) which very closely makes the amount. The point of greatest bending moment therefore is at A, say 1′ 8″ to the left of the weight, or 140″ from q: As a check begin at p and we must pass along 160″ or 13′ 4″ of uniform load before reaching the point A, at 500 pounds a foot this would make $13\tfrac{1}{3}.500. = 6666$ or close enough to amount of reaction p for all practical purposes.

TABLE XIX. — LIST OF TRENTON I-BEAMS.

Depth of Beam. (d)	Weight Per Yard.	Width of Flanges. (b)	Thickness of Web.	Area of each Flange	Area of Web.	Total Area. (a)	Axis Normal to Web. Moment of Inertia. (i)	Axis Normal to Web. Moment of Resistance. (r)	Axis Normal to Web. Square of Radius of Gyration. (ρ²)	Axis Normal to Web. Transverse Value (v) in lbs. For Iron.	Axis Normal to Web. Transverse Value (v) in lbs. For Steel.	Axis Parallel to Web. Moment of Inertia. (i)	Axis Parallel to Web. Moment of Resistance. (r)	Axis Parallel to Web. Square of Radius of Gyration. (ρ²)	Axis Parallel to Web. Transverse Value (v) in lbs. For Iron.	Axis Parallel to Web. Transverse Value (v) in lbs. For Steel.
20"	272	6¾	11/16	6,725	13,75	27,20	1650,3	165,0	60,67	1320000	1650000	46,90	13,76	1,71	110000	137600
20"	200	6	1/2	4,985	10,00	19,97	1236,0	123,6	61,89	990000	1238000	26,62	8,87	1,33	71000	88700
15⅛"	200	5¾	0,6	5,479	9,07	20,02	707,1	93,5	35,52	748000	935000	27,46	9,55	1,37	76000	95500
15⅛"	130	5	1/2	3,725	7,59	15,06	523,5	69,0	34,80	552000	690000	15,29	6,12	1,02	49000	61200
15⅛"	125	5	0,42	3,005	6,35	12,36	434,5	57,5	35,16	460000	575000	11,64	4,66	0,94	37000	46600
12¾"	170	5½	0,6	4,690	7,39	16,77	391,2	63,5	23,32	508000	635000	25,41	9,24	1,52	74000	92400
12¼"	125	4,79	0,47	3,290	5,75	12,35	288,0	47,0	23,36	376000	470000	11,54	4,82	0,93	38500	48200
12"	120	5½	0,39	3,525	4,68	11,73	281,3	46,9	23,98	375000	469000	16,76	6,10	1,43	49000	61000
12"	96	5¼	5/16	2,810	3,84	9,46	229,2	38,2	24,22	306000	382000	11,66	4,44	1,23	36500	44400
10½"	135	5	0,47	4,215	4,93	13,36	233,7	44,5	17,49	356000	445000	15,60	6,32	1,16	50500	63200
10½"	105	4½	3/8	3,255	3,93	10,44	185,6	35,3	17,77	282000	353000	9,45	4,19	0,90	33500	41800
10½"	90	4½	5/16	2,610	3,28	8,50	164,0	31,2	19,42	250000	312000	8,09	3,59	0,91	28700	35900
9"	125	4½	0,57	3,600	5,13	12,33	150,8	33,5	12,23	268000	335000	11,23	4,99	0,91	40000	49900
9"	85	4½	3/8	2,560	3,38	8,50	111,9	24,9	13,16	198000	248000	7,35	3,27	0,86	26000	32700
9"	70	4	0,3	2,130	2,70	7,00	93,9	20,9	13,41	167000	209000	4,92	2,46	0,70	19700	24600
8"	80	4½	3/8	2,533	2,96	8,03	83,9	21,0	10,44	168000	210000	7,55	3,35	0,93	26800	33600
8"	65	4	0,3	1,985	2,40	6,37	67,4	16,9	10,38	135000	169000	4,53	2,27	0,71	18200	22700
7"	55	3¾	0,3	1,700	2,10	5,50	44,3	12,7	8,05	101000	127000	3,80	2,06	0,71	16600	20800
6"	120	5¼	5/8	4,046	3,75	11,84	64,9	21,6	5,48	172000	216000	18,59	7,08	1,57	56600	70800
6"	90	5	1/2	2,850	3,00	8,70	49,8	16,6	5,72	132000	166000	10,78	4,32	1,24	34600	43200
6"	50	3½	0,3	1,555	1,80	4,91	29,0	9,6	5,90	76600	96000	2,74	1,57	0,56	12500	15700
6"	40	3	1/4	1,255	1,50	4,01	23,6	7,8	5,86	62400	78000	1,61	1,07	0,40	8400	10700
5"	40	3	5/16	1,170	1,56	3,90	15,4	6,1	3,96	48800	61000	1,68	1,12	0,43	9000	11200
5"	30	2¾	1/4	0,896	1,20	2,99	12,1	4,8	4,04	38400	48000	1,04	0,76	0,35	6000	7600
4"	37	3	5/16	1,205	1,26	3,66	9,2	4,6	2,51	36800	46000	1,74	1,16	0,48	9300	11600
4"	30	2¾	1/4	0,955	1,00	2,91	7,6	3,75	2,57	30000	37500	1,11	0,81	0,38	6500	8100
4"	18	2	3/16	0,510	0,75	1,77	4,5	2,25	2,54	18000	22500	0,31	0,31	0,176	2600	3100
1½"	5½	1½	1/8	0,183	0,18	0,52	0,155	0,21	0,28		2160	0,089	0,092	0,015		920

HOW TO USE TRANSVERSE VALUE (v) FOR BEAMS BRACED SIDEWAYS

Manner of Loading	To Obtain Safe Load in lbs.	Length of Span not to crack plastering must not exceed. For Iron.	For Steel.	Greatest Actual Deflection will be. For Iron.	For Steel.	Manner of Loading.	To Obtain Safe Load in lbs.	Length of Span not to crack plastering must not exceed. For Iron.	For Steel.	Greatest Actual Deflection will be. For Iron.	For Steel.
	$u = \frac{v}{L}$	$L = 2\tfrac{1}{4}d.$	$L = 2\,d$	$\delta = \frac{L^2}{73.d}$	$\delta = \frac{L^2}{64.8.d}$		$w_I = w_{II} = \frac{v}{2\tfrac{2}{3}L}$ or:- $w_I + w_{II} = \frac{v}{1\tfrac{1}{3}L}$	$L = 2\tfrac{3}{16}.d$	$L = 1\tfrac{7}{8}d$	$\delta = \frac{L^2}{72\tfrac{1}{5}.d}$	$\delta = \frac{L^2}{62\tfrac{1}{2}\,d}$
	$w = \frac{v}{2\,L}$	$L = 2\tfrac{1}{3}d$	$L = 2\tfrac{1}{3}.d$	$\delta = \frac{L^2}{93\tfrac{3}{4}d}$	$\delta = \frac{L^2}{80\tfrac{2}{3}d}$		$w_{III} = w_{III} = \frac{v}{2.L}$ or:- $w_{III} + w_{III} = \frac{v}{L}$	$L = 2.d$	$L = 1\tfrac{3}{4}d$	$\delta = \frac{L^2}{67.d}$	$\delta = \frac{L^2}{57\tfrac{1}{2}.d}$

d = depth in inches, L = length in feet δ = deflection in inches; v = transverse value, as given in tables XIX to XXIII; u = uniform load in lbs.; w = centre load in lbs.; $w_I = w_{II}$ also $w_{III} = w_{III}$ = concentrated loads in lbs.

NOTE. — If the transverse values (v) — given for steel — are used, test each piece carefully, as steel varies greatly in strength. For *equal* deflections of steel and iron, add only 7½% to iron transverse values, instead of 25% as given in tables.

GLOSSARY OF SYMBOLS. — The following letters, *in all cases*, will be found to express the same meaning, *unless distinctly otherwise stated*, viz.: —

- a = *area*, in square inches.
- b = *breadth*, in inches.
- c = constant for *ultimate resistance to compression*, in pounds, per square inch.
- d = *depth*, in inches.
- e = constant for *modulus of elasticity*, in pounds-inch, that is, pounds per square inch.
- f = *factor-of-safety*.
- g = constant for *ultimate resistance to shearing*, per square inch, across the grain.
- g_I = constant for *ultimate resistance to shearing*, per square inch, lengthwise of the grain.
- h = *height*, in inches.
- i = *moment of inertia*, in inches. [See Table I.]
- k = *ultimate modulus of rupture*, in pounds, per square inch.
- l = *length*, in inches.
- m = *moment or bending moment*, in pounds-inch.
- n = *constant* in Rankine's formula for compression of long pillars. [See Table I.]
- o = the *centre*.
- p = the *amount* of the *left-hand re-action* (or support) of beams, in pounds.
- q = the *amount* of the *right-hand re-action* (or support) of beams, in pounds.
- r = *moment of resistance*, in inches. [See Table I.]
- s = *strain*, in pounds.
- t = constant for *ultimate resistance to tension*, in pounds, per square inch.
- u = *uniform load*, in pounds.
- v = *stress*, in pounds.
- w = *load at centre*, in pounds.
- x, y and z signify *unknown quantities*, either in pounds or inches.
- δ = *total deflection*, in inches.
- ρ^2 = *square of the radius of gyration*, in inches. [See Table I.]
- ɒ = *diameter*, in inches.
- ɼ = *radius*, in inches
- π = 3.14159, or, say, 3 1-7 signifies the *ratio of the circumference and diameter of a circle.*

If there are more than one of each kind, the second, third, etc., are indicated with the Roman numerals, as, for instance, a, a_I, a_{II}, a_{III}, etc., or b, b_I, b_{II}, b_{III}, etc.

In taking moments, or bending moments, strains, stresses, etc., to signify at what point they are taken, the letter signifying that point is added, as, for instance: —

- m = moment or bending moment at *centre*.
- m_A = " " " *point A.*
- m_B = " " " *point B.*
- m_X = " " " *point X.*
- s = strain at *centre*.
- s_B = " *point B.*
- s_X = " *point X.*
- v = stress at *centre*.
- v_D = " *point D.*
- v_X = " *point X.*
- w = load at *centre*.
- w_A = " *point A.*

[1] Continued from No. 641, page 164.

The uniform load per inch will be $\frac{500}{12} = 41\frac{2}{3}$ pounds.

Now the bending moment at A will be, taking the right-hand side (Formula 24)

$$M_A = 6850.140 - 41\tfrac{2}{3}.140.70 - 1000.20$$
$$= 530\,667 \text{ pounds-inch.}$$

As a check take the left-hand side (Formula 23)

$$M_A = 6650.160 - 41\tfrac{2}{3}.160.80$$
$$= 530614 \text{ pounds-inch, or near enough alike for all}$$

practical purposes.

Now the safe modulus of rupture for wrought-iron (Table IV) is $\left(\frac{k}{f}\right) = 12000$ pounds, therefore the required moment of resistance r from Formula (18)

$$r = \frac{530667}{12000} = 44,2$$

Looking at the Table XIX we find the nearest moment of resistance to be 46,8 or we should use the 12″ — 120 pounds per yard I-beam. But the beam is unsupported sideways. The width of top flange is $b = 5\frac{1}{2}''$. We now use Formula (78) to find out how much extra strength we require.

Reduction for Lateral Flexure. In inserting value for y, we use the second column of Table XVI, as the beam is, of course, of uniform cross-section throughout, and have

$$y = 0,0192.$$

In place of w we can insert the actual value r of the beam, and see what proportion of it is left to resist the transverse strength, after the lateral flexure is attended to,

$$\text{or } r_1 = \frac{r}{1 + \frac{0,0192.25^2}{5\frac{1}{2}^2}} = \frac{r}{1 + 0,3966} \text{ or}$$

TABLE XX.—LIST OF CHANNELS.

Depth of Channel (d)	Weight Per Yard	Width of Flanges (b)	Thickness of Web	Area of each Flange	Area of Web	Total Area (a)	Axis Normal to Web: Moment of Inertia (i)	Moment of Resistance (r)	Square of Radius of Gyration (g^2)	Transverse Value (v) in lbs. For Iron	Transverse Value (v) in lbs. For Steel	Axis Parallel to Web: Moment of Inertia (i)	Moment of Resistance (r)	Square of Radius of Gyration (g^2)	Distance of Neutral Axis from Back of Web	Transverse Value (v) in lbs. For Iron	Transverse Value (v) in lbs. For Steel
15"	230	5 1/64"	1 1/64"	5.09	12.82	23.00	669.7	88.09	28.75	705000	881000	37.56	10.05	1.63	1.28	80500	100500
15"	190	4 3/4"	3/4"	4.77	9.46	19.00	586.0	78.13	30.84	625000	781300	32.25	9.24	1.70	1.26	74000	92400
15"	195	4 1/2"	1"	3.00	13.50	19.50	516.6	68.88	26.49	551000	688800	18.75	5.54	0.96	0.99	43000	53400
15"	120	4"	1/2"	2.63	6.74	12.00	376.0	50.13	31.33	401000	501500	14.47	4.74	1.21	0.95	38000	47400
12 1/4"	178	4 5/16"	1"	3.84	10.12	17.80	339.4	55.41	19.07	443300	554100	20.65	6.55	1.16	1.16	52500	65500
12 1/4"	140	4"	11/16"	3.52	6.96	14.00	291.6	47.64	29.83	381000	476400	17.87	6.20	1.28	1.12	49600	62000
12 1/4"	140	3 9/16"	0.9"	2.15	9.74	14.00	240.5	39.26	17.18	314000	392600	7.14	2.59	0.51	0.805	20700	25900
12 1/4"	70	3"	0.33"	1.72	3.56	7.00	155.2	25.03	21.89	200000	250300	5.04	2.24	0.72	0.735	18000	22400
10 1/2"	105	3 3/16"	0.8"	1.50	7.50	10.50	129.4	24.64	12.32	197000	246400	4.96	1.98	0.47	0.69	16000	19800
10 1/2"	60	2 3/4"	3/8"	1.24	3.52	6.00	88.4	16.84	14.73	134700	168400	3.84	1.81	0.64	0.628	14500	18100
10"	92	2 15/16"	3/4"	1.18	6.84	9.20	100.5	20.10	10.92	161000	201000	3.02	1.31	0.53	0.626	10500	13100
10"	40	2 1/2"	5/16"	0.97	2.86	4.80	64.0	12.80	13.33	102400	128000	2.20	1.14	0.46	0.565	9100	11400
9"	109	3 9/16"	7/8"	2.17	6.56	10.90	108.7	24.16	9.97	193300	241600	7.30	2.75	0.67	0.91	22000	27500
9"	70	3 1/8"	7/16"	1.86	3.28	7.00	82.1	18.24	11.73	146000	182400	5.35	2.35	0.76	0.85	18800	23500
9"	77	2.79"	5/8"	1.41	4.88	7.70	76.7	17.04	9.96	136300	170400	3.25	1.51	0.43	0.65	12100	15100
9"	50	2 1/2"	0.33"	1.21	2.58	5.00	58.8	13.07	11.76	104600	130700	2.53	1.35	0.51	0.63	10800	13500
8"	74	2.86"	3/8"	1.61	4.18	7.40	60.1	15.03	8.12	120200	150300	3.53	1.69	0.48	0.755	13500	16900
8"	45	2 1/2"	0.26"	1.38	1.74	4.50	44.5	11.12	9.89	89000	111200	2.54	1.46	0.56	0.76	11700	14600
8"	62	2 9/16"	9/16"	1.15	3.90	6.20	48.4	12.10	7.81	97000	121000	1.94	0.98	0.31	0.584	7840	9800
8"	35	2.2"	0.2"	0.96	1.38	3.30	32.9	8.22	9.97	65700	82200	1.44	0.89	0.44	0.580	7120	8900
7"	54	2 3/4"	1/2"	1.23	2.94	5.40	34.2	9.77	6.33	78000	97700	2.53	1.22	0.47	0.684	9760	12200
7"	36	2 1/2"	1/4"	1.07	1.46	3.60	27.1	7.74	7.53	62000	77400	1.96	1.10	0.54	0.715	8800	11000
7"	46	2.29"	0.49"	0.78	3.04	4.60	25.6	7.31	5.57	58500	73100	1.11	0.62	0.24	0.508	4960	6200
7"	25 1/2	2"	0.2"	0.66	1.23	2.55	17.3	4.94	6.78	59500	49400	0.83	0.56	0.33	0.511	4500	5600
6"	66	2.85"	3/4"	1.52	3.56	6.60	28.0	9.33	4.24	74600	93300	2.95	1.43	0.45	0.788	14300	14300
6"	45	2 1/2"	0.4"	1.30	1.90	4.50	21.7	7.23	4.82	58000	72300	2.12	1.20	0.47	0.725	9600	12000
6"	54	2.6"	5/8"	1.16	3.08	5.40	23.4	7.80	4.33	62400	78000	1.84	0.95	0.54	0.662	7600	9500
6"	35	2 1/4"	0.28"	0.96	1.38	3.30	17.2	5.73	5.21	46000	57300	1.30	0.80	0.59	0.630	6400	8000
6"	45	2 1/4"	9/16"	0.81	2.88	4.50	19.5	6.50	4.33	52000	65000	1.03	0.61	0.25	0.556	4880	6100
6"	22 1/2	1 7/8"	0.18"	0.66	0.93	2.25	12.6	4.20	5.60	33600	42000	0.70	0.52	0.31	0.540	4160	5200
5"	34	1.92"	1/2"	0.65	2.10	3.40	10.5	4.12	3.03	33000	41200	0.63	0.44	0.19	0.495	3520	4400
5"	19	1 5/8"	0.2"	0.53	0.84	1.90	7.2	2.88	3.80	23000	28800	0.44	0.38	0.23	0.464	3040	3800
4"	29	1.81"	0.31"	0.64	1.62	2.90	5.6	2.80	1.93	22400	28000	0.49	0.38	0.17	0.504	3040	3800
4"	16 1/2	1 1/2"	0.2"	0.51	0.63	1.65	3.9	1.95	2.36	15600	19600	0.52	0.31	0.19	0.460	2480	3100
3"	25	1.83"	0.53"	0.67	1.16	2.50	2.7	1.80	1.08	14400	18000	0.47	0.37	0.19	0.569	2960	3700
3"	13	1 1/2"	0.2"	0.53	0.44	1.50	2.0	1.33	1.33	10640	13300	0.29	0.29	0.19	0.510	2520	2900

For Use of Transverse Values, also Deflection and Lengths of Spans, See Table XIX.

NOTE.—If the transverse values (v)—given for steel—are used, test each piece carefnlly, as steel varies greatly in strength. For *equal* deflections of steel aud iron, add only 7½% to iron transverse values, instead of 25% as given in tables.

TABLE XXI.—LIST OF EVEN-LEGGED ANGLES.

Size of Angle	Weight per Yard.	Thickness	Area of Each Leg	Total Area.	Axis Parallel to one side: Moment of Inertia (i)	Moment of Resistance (r)	Square of Radius of Gyration (g^2)	Distance of Neutral Axis from Base.	Transverse Value (v) in lbs. For Iron.	Transverse Value (v) in lbs. For Steel.	Axis at 45° to sides: Moment of Inertia (i)	Moment of Resistence (r)	Square of Radius of Gyration (g^2)
6"	97.3	7/8"	4.86	9.73	31.91	7.63	3.28	1.829	61000	76300	18.10	1.34	2.58
6"	57.5	1/2"	2.87	5.75	19.91	4.61	3.46	1.685	36900	46100	7.75	1.35	2.39
4 1/2"	61.9	3/4"	3.09	6.19	11.20	3.60	1.80	1.396	28800	36000	4.88	0.772	1.98
4 1/2"	37.5	7/16"	1.87	3.75	7.20	2.24	1.92	1.286	18000	22400	2.65	0.707	1.82
4"	54.4	3/4"	2.72	5.44	7.66	2.81	1.40	1.271	22500	28100	3.45	0.634	1.80
4"	28.6	3/8"	1.43	2.86	4.36	1.52	1.52	1.138	12200	15200	1.86	0.650	1.60
3 1/2"	43.4	11/16"	2.17	4.34	4.68	1.97	1.08	1.122	15750	19700	2.04	0.470	1.59
3 1/2"	24.8	3/8"	1.24	2.48	2.86	1.15	1.15	1.013	9200	11500	1.20	0.484	1.43
3"	36.5	11/16"	1.82	3.65	2.77	1.38	0.76	0.996	11000	13000	1.05	0.288	1.41
3"	14.4	1/4"	0.72	1.44	1.24	0.58	0.86	0.842	4640	5800	0.52	0.361	1.19
2 3/4"	27.7	9/16"	1.38	2.77	1.83	0.98	0.66	0.887	7840	9800	0.61	0.220	1.25
2 3/4"	16.2	5/16"	0.81	1.62	1.15	0.59	0.71	0.802	4720	5900	0.50	0.309	1.13
2 1/2"	22.5	1/2"	1.12	2.25	1.28	0.76	0.57	0.806	6080	7600	0.51	0.227	1.14
2 1/2"	11.9	1/4"	0.59	1.19	0.70	0.39	0.59	0.717	3120	3900	0.30	0.252	1.01
2 1/4"	17.8	7/16"	0.89	1.78	0.78	0.51	0.44	0.720	4080	5100	0.35	0.197	1.02
2 1/4"	10.6	1/4"	0.53	1.06	0.50	0.31	0.47	0.654	2480	3100	0.22	0.208	0.925
2"	13.6	3/8"	0.68	1.36	0.45	0.33	0.33	0.634	2640	3300	0.21	0.154	0.897
2"	9.4	7/32"	0.47	0.94	0.31	0.22	0.33	0.580	1760	2200	0.13	0.138	0.820
1 3/4"	9.96	5/16"	0.50	1.00	0.27	0.23	0.27	0.550	1840	2300	0.12	0.120	0.778
1 3/4"	6.21	3/16"	0.31	0.62	0.18	0.15	0.29	0.507	1200	1500	0.08	0.129	0.717
1 1/2"	8.40	5/16"	0.42	0.84	0.16	0.16	0.19	0.487	1280	1600	0.07	0.083	0.689
1 1/2"	5.27	3/16"	0.26	0.53	0.11	0.10	0.21	0.444	800	1000	0.05	0.094	0.628
1 1/4"	5.63	1/4"	0.28	0.56	0.077	0.091	0.138	0.404	728	910	0.04	0.071	0.571
1 1/4"	2.97	1/8"	0.15	0.30	0.044	0.050	0.147	0.358	400	500	0.02	0.067	0.506
1"	4.38	1/4"	0.22	0.44	0.037	0.056	0.084	0.340	448	560	0.02	0.045	0.481
1"	2.34	1/8"	0.115	0.23	0.022	0.031	0.096	0.296	250	310	0.01	0.043	0.419
7/8"	2.93	3/16"	0.145	0.29	0.019	0.032	0.066	0.286	256	320	—	—	0.404
7/8"	2.03	1/8"	0.100	0.20	0.014	0.023	0.070	0.264	184	230	—	—	0.373
3/4"	2.46	3/16"	0.125	0.25	0.012	0.024	0.048	0.254	192	240	—	—	0.359
3/4"	1.72	1/8"	0.085	0.17	0.009	0.017	0.053	0.233	156	170	—	—	0.329

For Use of Transverse Values, also Deflection and Lengths of Spans, See Table XIX.

NOTE.—If the transverse values (v)—given for steel—are used, test each piece carefully, as steel varies greatly in strength. For *equal* deflections of steel and iron, add only 7½% to iron transverse values, instead of 25% as given in tables.

TABLE XXII. — LIST OF EVEN-LEGGED ANGLES.

Size of Angle	Weight per Yard.	Thickness.	Area of Long Leg.	Area of Short Leg.	Total Area. (a)	Axis Parallel to Short Leg: Moment of Inertia. (i)	Moment of Resistance. (r)	Square of Radius of Gyration. (g^2)	Distance of Neutral Axis from Base.	Transverse Value (v) in lbs. For Iron.	For Steel.	Axis Parallel to Long Leg: Moment of Inertia. (i)	Moment of Resistance. (r)	Square of Radius of Gyration. (g^2)	Distance of Neutral Axis from Base.	Transverse Value (v) in lbs. For Iron.	For Steel.	Axis M-N Parallel to A-B: Moment of Inertia. (i)	Square of Radius of Gyration (g^2)	Perpendicular Distance of Neutral Axis from Apex.
6" x 4"	69.4	3/4"	4.22	2 72	6 94	24 52	6 26	3.53	2.050	50080	62600	8 68	2 97	1 25	1 078	23760	29700	5 72	0.825	2 00
6" x 4"	41.8	7/16	2.53	1 65	4 18	15 46	3.83	3.70	1 964	30640	38300	5 60	1 84	1 34	0.964	14720	18400	3.55	0.849	1 86
5" x 3½"	58.1	3/4"	3.47	2.34	5.81	13 90	4 26	2.39	1.744	34080	42600	5 40	2 12	0.93	0.995	16960	21200	3 72	0.640	1 83
5" x 3½"	30.5	3/8"	1.80	1.25	3.05	7 78	2 30	2 55	1.610	18400	23000	3.19	1.21	1 05	0.860	9680	12100	1.96	0.642	1.65
4½" x 3"	50.6	3/4"	3.09	1.97	5.06	9 73	3.39	1.92	1 625	27120	33900	3 41	1.62	0 67	0.894	12960	16200	2.45	0.484	1.65
4½" x 3"	26.7	3/8"	1.62	1 05	2 67	5.49	1 83	2.05	1 490	14640	18300	1.98	0.88	0 74	0 740	7040	8800	1.25	0.470	1.47
4" x 3"	43.4	11/16	2.51	1.83	4.34	6 52	2.50	1 50	1 390	20000	25000	3.08	1.46	0 71	0 890	11680	14600	1.86	0.428	1.56
4" x 3"	20.9	5/16	1.20	0.89	2.09	3.37	1.23	1 61	1 260	9840	12300	1.64	0.732	0 785	0.760	5856	7320	0.77	0.368	1.40
3½" x 3"	40.0	11/16	2.17	1 83	4.00	4.42	1 91	1 105	1.188	15280	19100	2.96	1.436	0 740	0.939	11488	14360	1.64	0.410	1.50
3½" x 3"	15.6	1/4"	0.84	0 72	1.56	1.91	0 744	1.224	1.035	6192	7740	1 30	0.587	0 833	0 785	4696	5870	0.61	0.391	1.28
3½" x 1½"	11.9	1/4"	0.84	0.35	1.19	1.50	0.688	1.260	1 320	5504	6880	0.17	0 144	0 143	0.320	1152	1440	0.16	0.134	0.76
3" x 2½"	27 7	9/16	1.52	1.25	2 77	2.34	1.184	0 844	1.024	9472	11840	1 45	0.840	0.523	0 774	6720	8400	0.91	0.328	1 25
3" x 2½"	13.1	1/4"	0.72	0.59	1.31	1.17	0.560	0.893	0.910	4480	5600	0.74	0 402	0.565	0.660	3216	4020	0.36	0.275	1.10
3" x 2"	22.5	1/2"	1.38	0.87	2.25	1 93	1 007	0 858	1.083	8056	10070	0.62	0 437	0 275	0 583	3496	4370	0.47	0.209	1.13
3" x 2"	10 4	7/32"	0.63	0.41	1.04	0.97	0.480	0.934	0.980	3840	4800	0.35	0.230	0.336	0 480	1840	2300	0.24	0.231	0.93

For Use of Transverse Values, also Deflection and Lengths of Spans, See Table XIX.

NOTE. — If the transverse values (v) — given for steel — are used, test each piece carefully, as steel varies greatly in strength. For *equal* deflections of steel and iron, add only 7½% to iron transverse values, instead of 25 as given in tables.

TABLE XXIII. — LIST OF TRENTON TEES AND DECK BEAMS.

Depth over all. (d)	Weight per Yard.	Width of Table or Flange. (b)	Thickness.	Area of Flange.	Area of Web.	Total Area. (a)	Axis Normal to Web: Moment of Inertia. (i)	Moment of Resistance. (r)	Square of Radius of Gyration. (g^2)	Distance of Neutral Axis from Base.	Transverse Value (v) in lbs. For Iron.	For Steel.	Axis Parallel to Web: Moment of Inertia. (i)	Moment of Resistance. (r)	Square of Radius of Gyration. (g^2)	Transverse Value (v) in lbs. For Iron.	For Steel.
4" Tee	37,5	4"	½"	2,00	1,75	3,75	5,56	1,97	1,48	1,18	15760	19700	2,62	1,31	0,70	10480	13100
3½" "	32,5	3½"	½"	1,75	1,50	3,25	3,64	1,49	1,12	1,06	11920	14900	1,82	1,04	0,56	8320	10400
3½" "	28,7	3½"	7/16"	1,53	1,34	2,87	3,26	1,32	1,14	1,03	10560	13200	1,53	0,87	0,53	6960	8700
3" "	27,5	3"	½"	1,50	1,25	2,75	2,21	1,07	0,80	0,93	8560	10700	1,15	0,77	0,42	6160	7700
3" "	21,1	3"	3/8"	1,13	0,98	2,11	1,76	0,834	0,834	0,89	6670	8340	0,97	0,65	0,46	5200	6500
2½" "	17,3	2½"	3/8"	0,93	0,80	1,73	0,98	0,563	0,566	0,76	4500	5630	0,49	0,39	0,28	3120	3900
2½" "	14,7	2½"	5/16"	0,78	0,69	1,47	0,85	0,483	0,578	0,74	3860	4830	0,40	0,32	0,272	2560	3200
2¼" "	11,9	2¼"	9/32"	0,63	0,56	1,19	0,56	0,352	0,470	0,66	2820	3520	0,26	0,231	0,218	1850	2310
2" "	11,5	2"	5/16"	0,625	0,525	1,15	0,41	0,302	0,352	0,61	2420	3020	0,21	0,210	0,182	1680	2100
2" "	9,4	2"	¼"	0,50	0,44	0,94	0,35	0,247	0,372	0,59	1980	2470	0,16	0,160	0,170	1280	1600
1½" "	6,88	1½"	¼"	0,38	0,31	0,69	0,13	0,125	0,188	0,46	1000	1250	0,07	0,093	0,101	745	930
1¼" "	5,46	1¼"	¼"	0,31	0,25	0,56	0,076	0,089	0,136	0,40	710	890	0,042	0,067	0,075	535	670
1¼" "	4,86	1¼"	7/32"	0,27	0,22	0,49	0,065	0,075	0,133	0,38	600	750	0,034	0,054	0,070	430	540
1" "	3,3	1"	3/16"	0,18	0,15	0,33	0,030	0,044	0,091	0,315	350	440	0,016	0,032	0,048	255	320
1" "	2,76	1"	5/32"	0,15	0,13	0,28	0,024	0,034	0,085	0,295	270	340	0,012	0,024	0,043	190	240
2½" "	35,0	5"	½"	2,50	1,00	3,50	1,50	0,800	0,429	0,61	6400	8000	5,23	2,090	1,494	16720	20900
2" "	17,3	3"	3/8"	1,12	0,61	1,73	0,54	0,370	0,312	0,54	2960	3700	0,85	0,567	0,491	4540	5670
2" "	14,6	3"	5/16"	0,94	0,52	1,46	0,47	0,324	0,322	0,52	2590	3240	0,68	0,453	0,466	3630	4530
1⅞" "	7,4	2¼"	¼"	0,56	0,22	0,78	0,06	0,072	0,077	0,29	580	720	0,18	0,160	0,251	1280	1600
1½" "	9,0	2"	9/32	0,56	0,34	0,90	0,17	0,170	0,190	0,50	1360	1700	0,18	0,180	0,200	1440	1800
1" "	6,5	2"	¼	0,50	0,19	0,69	0,04	0,054	0,058	0,26	430	540	0,14	0,140	0,203	1120	1400
1" "	5,6	1½"	¼	0,37	0,19	0,56	0,04	0,055	0,071	0,28	440	550	0,07	0,093	0,125	745	930
8" Deck Beam	65,0	4½"	3/8	Flange—2,60 Bulb—1,25	2,65	6,50	54,70	11,28	8,42	3,15	90240	112800	3,7	1,64	0,570	13120	16400
7" " "	55,0	4½"	5/16	Flange—2,35 Bulb—1,20	1,75	5,50	35,10	8,05	6,38	2,64	64400	80500	3,6	1,60	0,650	12800	16000

For Use of Transverse Values, also Deflection and Lengths of Spans, See Table XIX.

NOTE. — If the transverse values (v) — given for steel — are used, test each piece carefully, as steel varies greatly in strength. For *equal* deflections of steel and iron, add only 7½% to iron transverse values, instead of 25% as given in tables.

$$r_1 = \frac{46,8}{1,3966} = 33,6$$ or the beam would not be strong enough. The next size would be the 12¼″ — 125 pounds per yard beam, but as the 15″ — 125 pounds per yard beam would cost no more and be much stronger we will try that. Its width of flange is $b = 5''$ and moment of resistance $r = 57,93$. Inserting these values in (Formula 78) and using r in place of w we have

$$r_1 = \frac{57,93}{1 + \frac{0,0192.25^2}{5^2}} = \frac{57,93}{1,48}$$

$$= 39,14$$

The required moment of resistance was

$r = 44,2$ so that this is still short of the mark, and we should have to use the next section or the 15″ — 150 pounds per yard beam. The moment of resistance of this beam is $r = 69,8$ its width of flange the same as before, therefore:

$$r_1 = \frac{69,8}{1,48} = 47,1$$

Or this beam would be a trifle too strong even if unsupported sideways. We need not bother with deflection, for the length of beam is only 1⅔ times the span, and besides not even ⅔ of the actual transverse strength of the beam is required to resist the vertical strains, and, of course, the deflection would be diminished accordingly.

Safe Uniform Load. The column in Table XIX headed "Transverse Value," gives the safe uniform load, in pounds, if divided by the span in feet, for beams supported sideways. Of course the result should correspond with Table XV, except that the uniform load will be expressed in pounds here, while it is expressed in tons of 2000 pounds each in the table. For Tables XX, XXI, XXII and XXIII the use of the "Transverse Value" is similar to Table XIX.

LOUIS DECOPPET BERG.

[To be continued.]

UNVEILING A PLASTER MODEL IN PLACE OF THE REAL STATUE.—Not long ago a Chicago sculptor, who had arranged to make a bronze statue of heroic size for a society in a neighboring State, discovered that it would be impossible to get the enormous figure cast by the day set for its unveiling. He consulted with the committee having the exercises in charge and was assured that the unveiling could not be postponed under any circumstances. The sculptor, as a last resort, put a coat of bronze paint on a clay model of the statue, shipped the brittle sham to the city in which the ceremony was to take place, and set it up on the pedestal. There it was successfully unveiled before an audience of thousands. Orators grew eloquent in praising its majestic appearance, and no one except the sculptor and the committee knew that it was not made of enduring bronze. A few days later the sham statue gave place to the real one. — *Chicago America.*

HAIR ROPES USED IN BUILDING. — A ton of ropes made from the hair of the women of Japan is used in building the $3,000,000 Buddhist temple at Kioto.

THE ILLUSTRATIONS

[*Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.*]

HOUSE OF J. C. ABBOTT, ESQ., MONTREAL, CANADA.
[Gelatine print, issued only with the Imperial Edition.]

SKETCH FOR AN ARTIST'S COUNTRY HOUSE BY MR. J. G. HOWARD.

HOUSE FOR HENRY ENDICOTT, ESQ., CAMBRIDGE, MASS. MESSRS. CHAMBERLIN & WHIDDEN, ARCHITECTS, BOSTON, MASS.

DESIGN FOR CONGREGATIONAL CHURCH, ELIZABETHTOWN, N. Y. MR. R. W. GIBSON, ARCHITECT, NEW YORK, N. Y.

CHURCH AT DUBLIN, N. H. MESSRS. ANDREWS & JAQUES, ARCHITECTS, BOSTON, MASS.

BUILDING FOR THE PIONEER PRESS, ST. PAUL, MINN. MR. S. S. BEMAN, ARCHITECT, CHICAGO, ILL.

PLANS FOR APARTMENT-HOUSES. MR. E. T. POTTER, ARCHITECT, NEW YORK, N. Y.

STUDY FOR A STORE BUILDING, ST. PAUL, MINN. MESSRS. GILBERT & TAYLOR, ARCHITECTS, ST. PAUL, MINN.

UNITED STATES GOVERNMENT BUILDING PRACTICE.[1]—X.

Porte St. Denis, Paris.

STRAINS are calculated by the graphic method, first, because the graphic method checks itself, and second, so that the strains for all trusses may be put on file and at any future time they may be referred to and the assumed loads and consequent strains may be readily seen.

SPECIFICATION FOR IRONWORK.

The contractor to furnish all materials and labor and put in place complete all the ironwork shown on the drawings and required by the specification of the shapes, dimensions, weights, thickness of metal, and set in positions plumb and level or at the proper inclinations, as the case may be.

Quality of Wrought-Iron. — All the wrought-iron beams, channels, angle-irons, tie-rods, etc., must be tough, ductile, fibrous and uniform in character, of American manufacture or equal thereto, of best quality iron, and must be rolled or wrought straight and true, and to have an elastic limit of at least 26,000 pounds and an ultimate tensile strength of at least 50,000 pounds per square inch of sectional area, and elongation not over 18 per cent in 8″. If foreign iron is offered it must be accompanied by proper certificates of tests.

All specimens cut from shape iron to stand a test of bending cold through 180° on a diameter not greater than twice the thickness of bar without showing signs of fracture.

All steel to be mild steel, having an ultimate tensile strength of 70,000 per square inch and an elastic limit not less than 36,000 pounds, and an elongation of 22 per cent in length of 8″.

Floor-Beams and Girders. — The beams, girders, channels, etc., to be framed as shown and to have standard connections, angle-irons, rivets, bolts, etc., except where otherwise shown. Beams forming girders to be bolted together through cast-iron separators not over 6′ apart (two bolts to each separator), and beams resting on top of girders to be bolted through flanges. The ends of beams and channels to rest 8″ in walls on bed-plates; if iron, 8″ x 12″ x 1″, and if stone, 8″ x 12″ x 2 1-2″, and girders to have bed-plates under them in walls of sizes shown.

Channels where required for skewbacks of arches to be anchored securely to walls by expansion-bolts 3-4″ diameter, 6″ to 8″ long, spaced generally 3′ apart. All girders and every alternate beam for floors above first story to be anchored to walls by wrought-iron anchors 3-4″ diameter, 3′ long, V-shaped, and let through web of beam 4″ from end.

Wrought-iron tie-rods 1″ diameter of proper length where shown on drawings to be provided for vault-arches and for all walls necessary to counteract the thrust of the arches; the tie-rods to pass through webs of at least two beams, and to have gib-plates 12″ x 4″ x 1-2″ built 1′ in walls and to be threaded and have nuts and washers on both ends.

The girders to be secured to lugs on heads of columns by bolts 3-4″ to 1″ diameter (two to each pair of beams), the beams of coupled girders [*i. e.*, one beam on top of another], to be riveted together through flanges on both sides of webs their entire length with 5-8″ diameter rivets spaced 4″ apart at ends for a distance of 3′ and 8″ apart at middle of spans. [Where beams are so riveted, their strength is increased fully one-third more than if left unriveted.]

The heads and nuts of all bolts and pins to be hexagonal. All bolts, rivets, etc., to be of the sizes shown, to be well fitted to and perfectly fill the openings designed to receive them.

Quality of Cast-Iron. — All the cast-iron must be best quality, sound and clean, free from cracks, bubbles, cinders and other defects; the moulded and ornamental work, bases and capitals of columns, etc., to be fine stove castings sharp and clean; all joints to be properly dressed to insure a perfect fit; the heads of screws and bolts to be countersunk flush with face of work.

Columns. — Cast-iron columns for supporting second-story girders on which rest the walls and floors to be in two pieces, the shaft in one piece, and the head with the flanges, lugs, etc., cast on to fit the profile of beams in another piece; a cast-iron stand is also frequently made on which the column rests. The stone cap of pier or template in wall to be dressed perfectly smooth and level on top, on which the iron bed-plate of column (usually 1 1-2″ to 2″ thick) rests, and to which it is secured by two expansion bolts 1″ diameter about 6″ long, the iron bed-plates to have a boss ring cast on about 1″ high, which is to fit accurately into core of columns or stands as the case may be; great care to be used in casting to have a uniform thickness of metal in the shafts, stands and heads respectively. The heads to have a boss from 2″ to 4″ long fitting into core of columns, the bearing-surfaces of plates, stands, shafts and heads to be turned perfectly smooth and at right angles to axes; the cores to be bored out to the depths required and the bosses turned to fit cores. The columns to be secured on top of stands by two 1″-diameter bolts. The stands, shafts and heads of columns to be of the same thickness of metal and uniform.

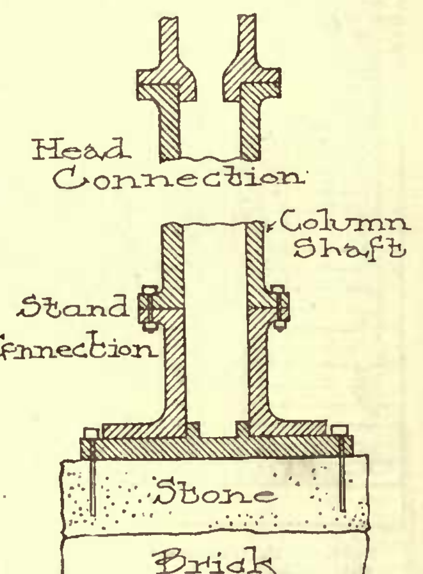


Fig. 39.

Bases, Capitals, etc. — The moulded bases and ornamental capitals of columns to be cast-iron 1-4″ or 3-8″ thick metal, in accordance with full-size detail or model, which will be furnished the contractor; the plinth of bases to go 1″ below floor line; all to be fastened together with 5-16″-diameter countersunk screws and to shafts with 1-2″-diameter countersunk top screws after the fireproof covering is put in place.

Pilasters. — The ornamental pilasters to be 3-8″ thick cast-iron, to be square, corresponding in design and detail to the columns, and secured to walls by expansion bolts 1-2″ diameter, 6″ long, passing through lugs on the pilasters (about eight to each pilaster).

Wrought-Iron Posts. — Instead of cast-iron columns, wrought-iron posts are frequently used, constructed of an I-beam in centre and channel-irons riveted to same through flanges, with angle-irons riveted to bottom and top to form bearing surfaces.

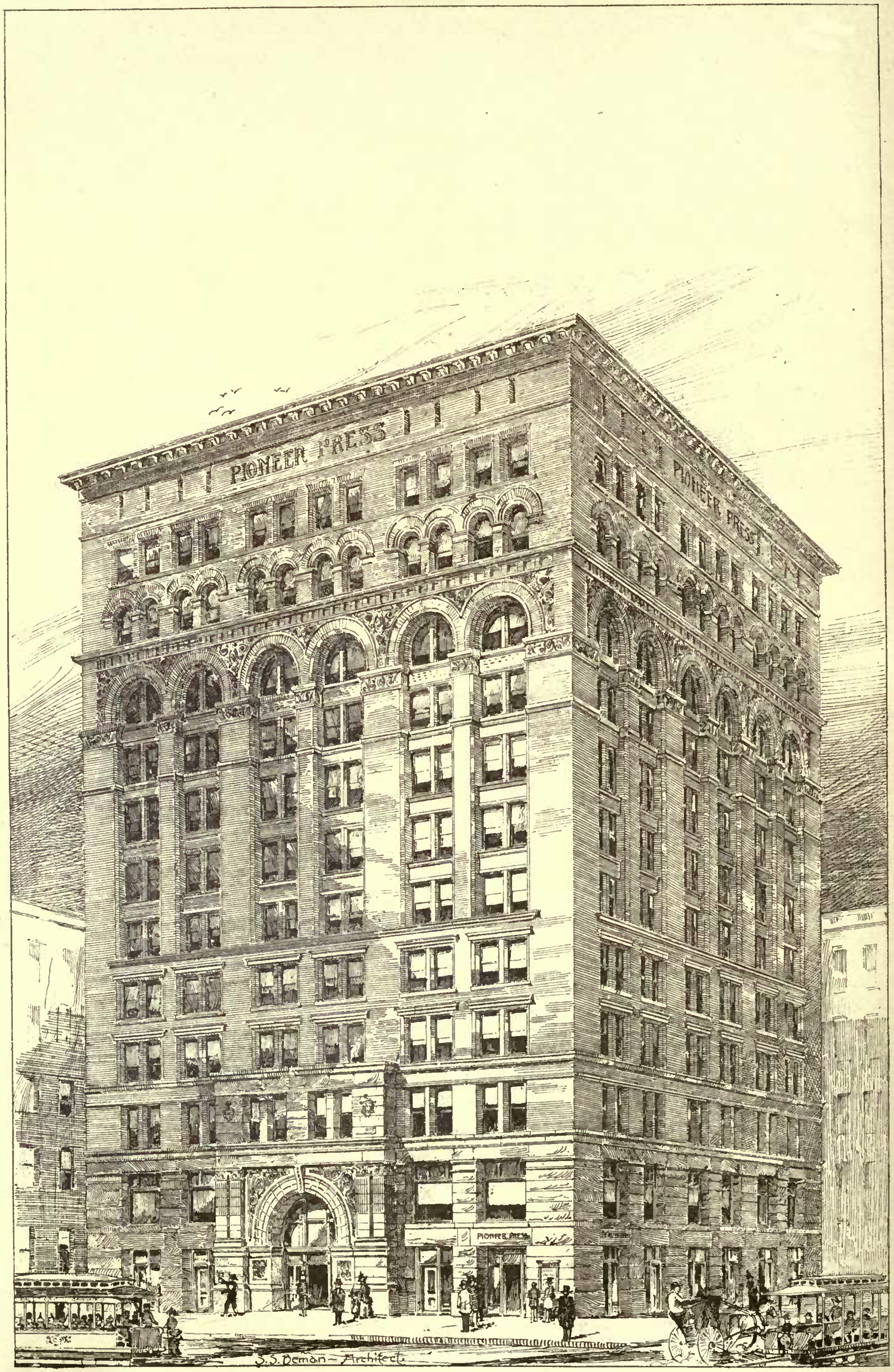
Fig. 40.

Lintels. — Cast-iron flanged lintels are frequently used for openings in brickwork; they are to have a bearing of not less than 4″ on jambs, to be 1-2″ thick metal, and to have a vertical rib their entire length from 4″ to 6″ high. Frequently a wrought angle-iron 3″ x 3″ or 4″ x 4″ is used for this purpose and is concealed between the brickwork and the wood frame for opening.

Roof. — The iron roof to be framed with trusses, hips, ridges, rafters, shoes, bearings, etc., as shown, the details of which must be strictly adhered to. The trusses to be constructed of wrought-iron rafters, tie-bars, struts, braces, etc., and secured by bolts to cast-iron shoes or angle-irons, which are to be secured to bearing-plates by expansion bolts. The braces for trusses and between different trusses to have sleeve nuts for adjustment.

[1] Continued from page 166, No. 641.

COPYRIGHT 1888 BY TICKNOR & Co



Heliotype Printing Co. Boston

"PIONEER PRESS"

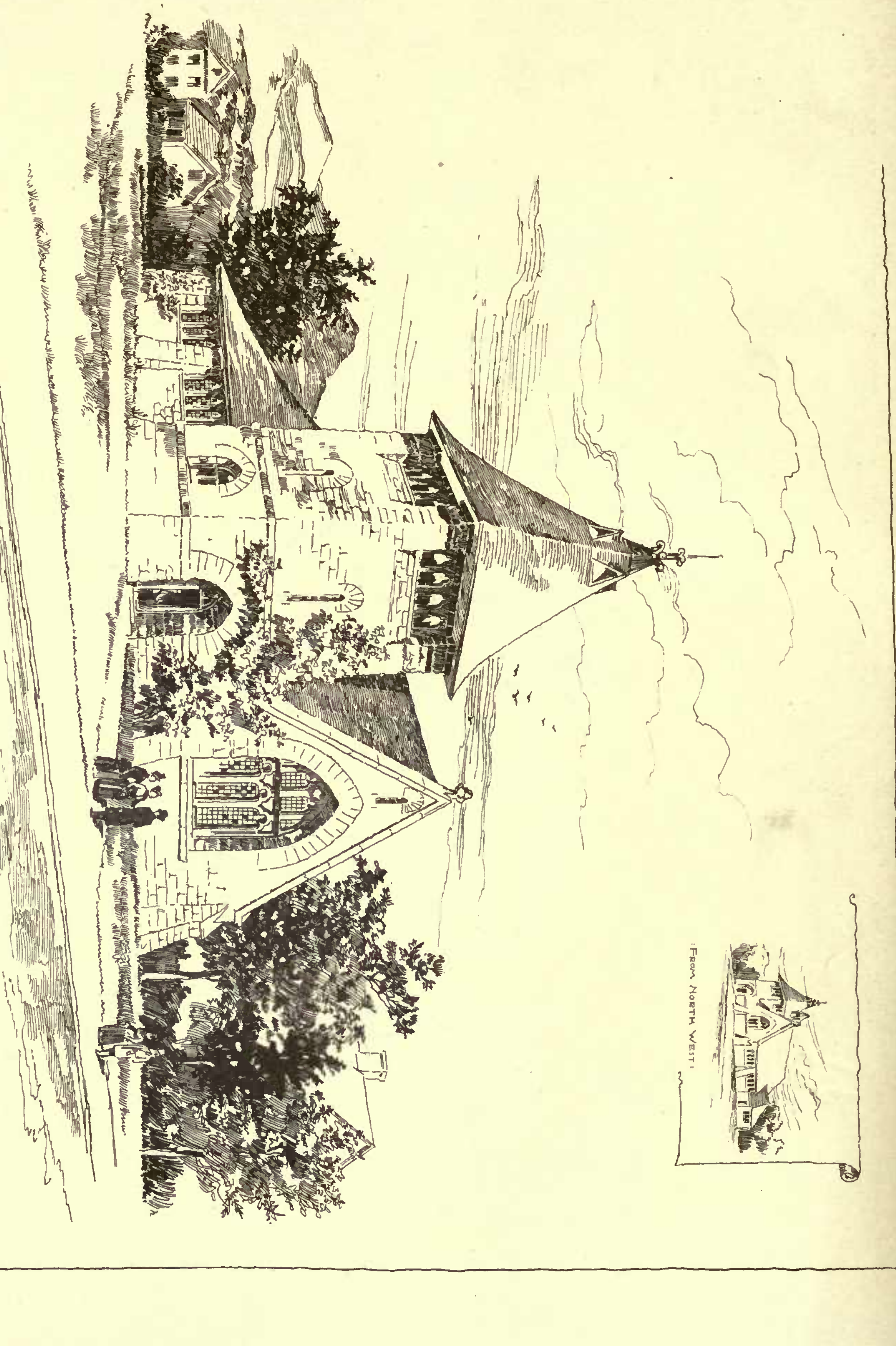
COPYRIGHT 1888 BY TICKNOR & CO

STUDY FOR A STORE BUILDING · AT ST. PAUL · MINNESOTA ·

· GILBERT AND TAYLOR · ARCHITECTS ·

Heliotype Printing Co. Boston.

COPYRIGHT 1888 BY TICKNOR & CO.

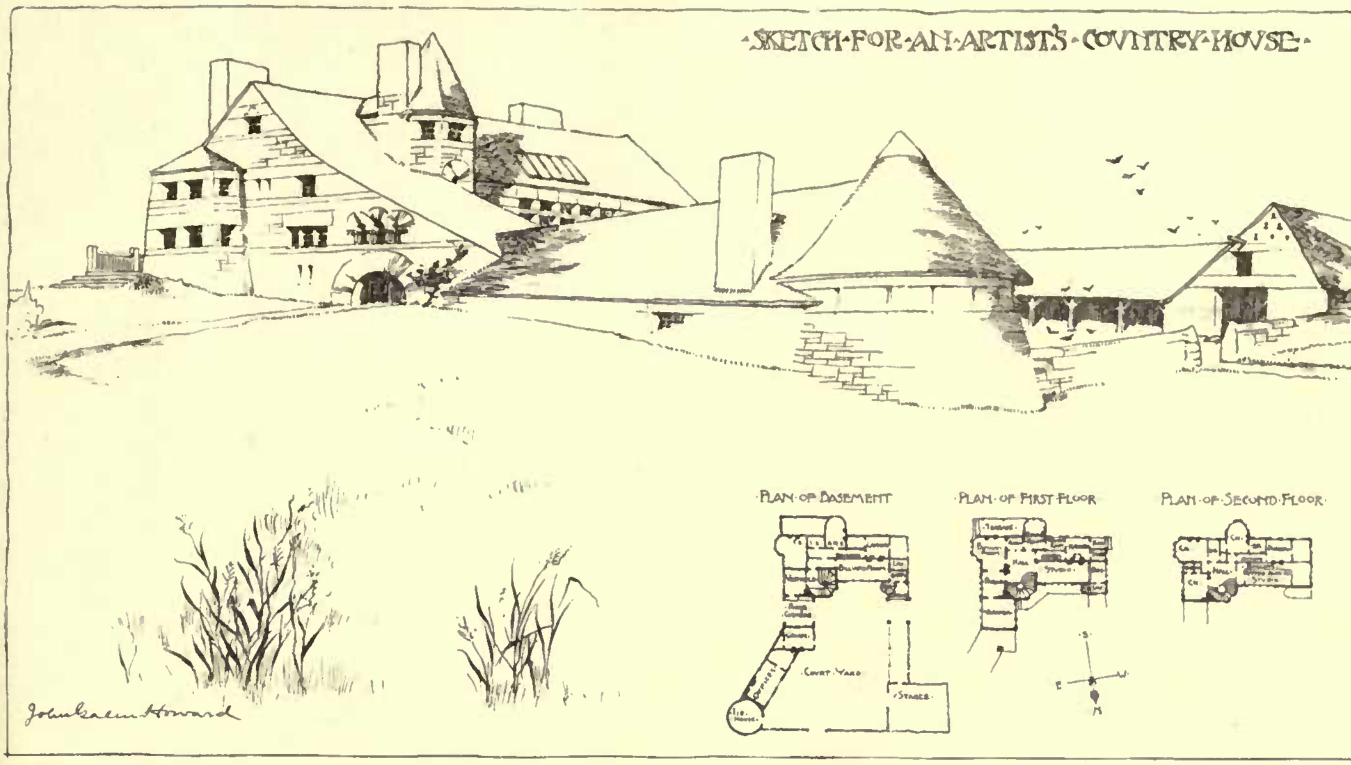


· · · DESIGN · FOR · · ·
· CONGREGATIONAL · CHURCH · AT ·
· · · ELIZABETHTOWN · N · Y · · ·

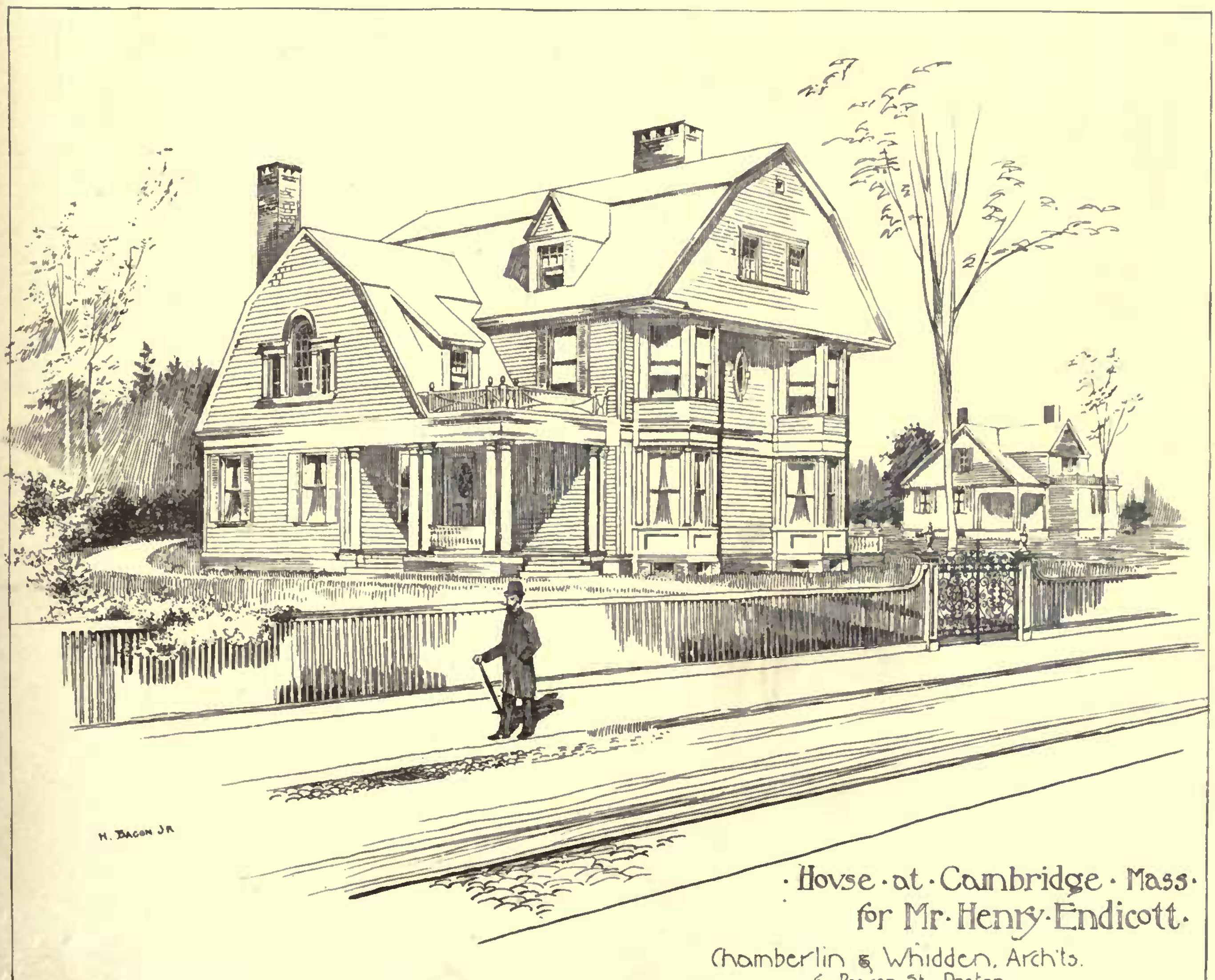
· R · W · GIBSON · ARCH'T · ALBANY · N · Y ·

Heliotype Printing Co. Boston.

COPYRIGHT 1888 BY TICKNOR & CO



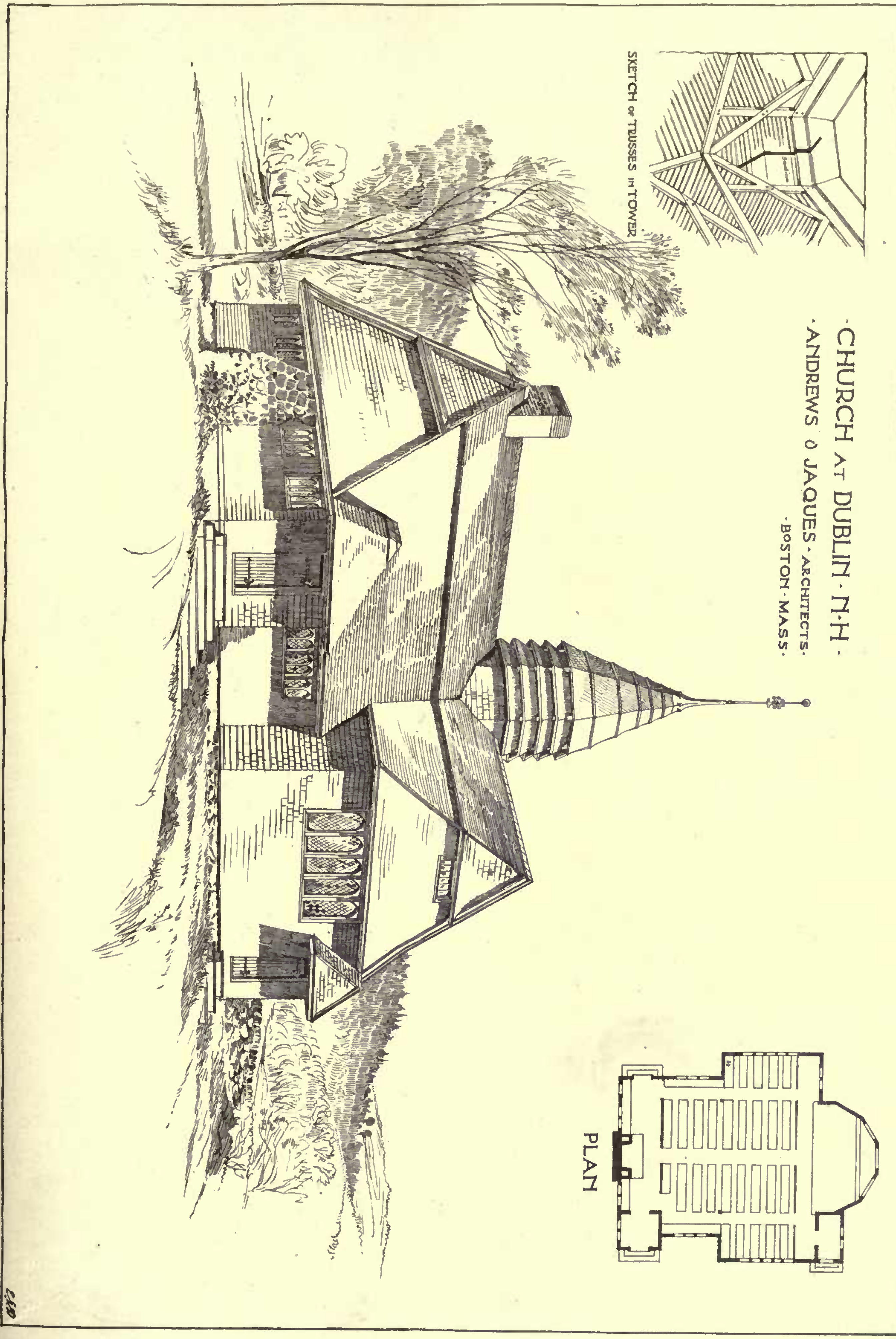
·SKETCH·FOR·AN·ARTIST'S·COUNTRY·HOUSE·



·House·at·Cambridge·Mass·
for Mr·Henry·Endicott·
Chamberlin & Whidden, Arch'ts.
6 Beacon St., Boston.

Heliotype Printing Co. Boston.

Copyright 1888 by Ticknor & Co.



Heliotype Printing Co. Boston

COPYRIGHT 1888 BY TICKNOR & CO

PLANS for APARTMENT-HOUSES,

EACH HOUSE TO BE ONE OF A PAIR OR SERIES;

ON LAND LAID OUT, AS IN NEW YORK, IN LOTS 25 FEET FRONT BY 100 FEET DEEP; AND

CONTAINING EQUIVALENT TO

FOUR DWELLINGS ON EACH FLOOR ON EACH LOT; EACH HOUSE ON ONE LOT AND A HALF,

ARRANGED ON E.T. POTTER'S SYSTEM FOR GROUPING DWELLINGS [FOR RENT OR SEPARATE OWNERS]

WITH LEAST LOSS OF LIGHT, AIR, PRIVACY, THOROUGH-DRAUGHT, SUNSHINE, ETC.

[Ten feet of the rear of each lot is left open as, in New York, required by Law.]

EACH HOUSE, ON EACH FLOOR, CONTAINS SIX DWELLINGS, VIZ: FOUR DWELLINGS OF THREE ROOMS EACH, & TWO DWELLINGS OF FOUR EACH.

INDEX:

S. Sitting Room. [average area 10ft by 12ft]
B. Bed Room. " " 9ft. " 10ft.
K. Kitchen. " " 6ft. " 9ft.
C. Closet and Bath. " " 2ft.6in. " 6ft.6in.
V. Vestibule. " " 2ft.6in. " 3ft.

Average area of Each Dwelling: Cir. 288 sq.ft. The very limited areas of the subdivisions are not less than those of many 1st Class Yachts, Dahabeeyahs, Ocean Steamers, Trains de Luxe, Vestibule Palace Cars, Etc., or than of many Hotels and Private Houses.

C Private Small Dumb-waiter, to be used in connection with:
" " Food Cellar [well-lighted]
" " Fuel "
" " Clothes-drying loggia,
" " Bleaching Space,
" " Garden-bed.

A room under Sidewalk, for Private Ash-cans.

By using the dumb-waiters No supplies, Refuse, Wet or soiled linen, etc., Need be carried on the Stairs.

⌒ Balcony = Air-duct } Fire places
⊂⊃ Wisteriae //// Alternate Dwellings.
ⵊⵊⵊ Fixed vertical translucent Louvres, set on the outside of sashes of Northerly-facing windows of Courts, acting as Screens; but not obstructing the passage of air or light.

Thoroughdraughts at Command through Every Dwelling.

Sunshine exposure: One hour or more daily of Every Dwelling.

Shade: Draw-up Blinds outside southerly windows; Awnings over Courts.

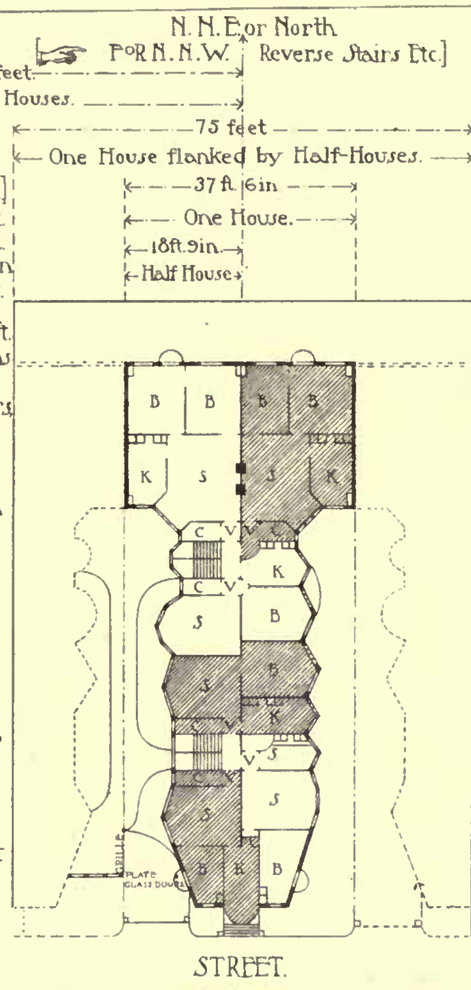
Quiet is furthered by the absence of passages, the Enclosing of Entrance-Corridor, etc.

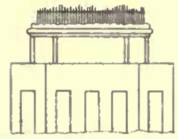
Outlook: Nearly equally Cheerful for each dwelling.

[The Sea Breeze, usually prevailing in New York on summer evenings, can enter each dwelling.

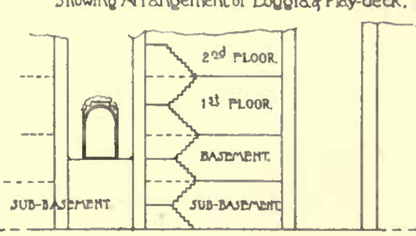
Overshadowing by Neighboring buildings is slight; that by this building will depend on its height and distance off.

All stairs to be full width throughout, and roofed in with glass: Entrance-Corridor to be enclosed with stained glass; a blanket of low growths on its roof [to deaden sun-glare].





ELEVATION OF END OF HOUSE-TOP, Showing Arrangement of Loggia & Play-deck.



SECTION OF ENTRANCE, CORRIDOR, ETC.

The Widths of Frontages most common in New York are:

12ft.6in. – 12ft.6in. – 16ft 4in – 16ft.4in. – 16ft 4in – 18ft 9in – 18ft 9in – 18ft 9in – 18ft 9in – 20ft. – 20ft. 10in – 21ft. 5½in – Etc.
— 25ft. — 50ft. — Copyright 1888 by E.T. Potter. — 1/5 of 100ft — 1/6 of 125ft — 1/7 of 150ft — Etc.

NOTES:

Fire-Escape to Street and to Roofs of adjoining Houses by Incombustible Stairs and Passages.

Insurance = By carrying party-walls well above house-tops; making all partitions, however thin, Incombustible [as in Paris]; Floors practically fire-proof, as in Florence; Using no wood for Stairs, unnecessary Trim, etc. Such buildings can be economically made Strong, Pleasing and Lasting, and Insurance Reduced.

Separate ownership of the Separate Dwellings grouped under one roof, opens profitable Proprietorship of Real-Estate to All who to small earnings add Industry and Thrift.

Erecting such groups of Dwellings is made easy by Building Associations, in which owning of Real-Estate is acquired by Small Weekly Payments.

Ready Sale, at fair prices, of such Dwellings, will be helped in proportion to their Attractive Situation, Exterior, Entrance, Finish, Convenience, Cheerfulness and estimated Healthfulness; the Respectability of Occupants; their Small Cost from Small Size; and an absence of indications of Class Distinctions.

In Investments in Real-Estate, a small sum invested in land to secure good light and air, will often bring in a better Return than a larger sum used in additional building which shuts out light and air.

By the Plans and Methods here indicated, the fullest number of families usually housed on New York lots are accommodated on an Equal Area, and the other main advantages of the New York Street and Lot System are retained, while the main evils generated by that System are avoided.

THIS PLAN IS SUITED TO LOTS RATHER WIDER OR NARROWER; BUT, ON NARROWER LOTS THE COST OF BUILDING WOULD NOT DIMINISH SO MUCH AS THE SIZE OF THE DWELLINGS, NOR WOULD THE INTEREST ON COST OF LAND SO SAVED PROBABLY EQUAL THE LOSS FROM THEIR DIMINISHED VALUE. WIDER LOTS WOULD GIVE LARGER ROOMS ETC; BUT NOT THEN COULD SO MANY FAMILIES LIVE ON THE SAME AREA OF GROUND.

Heliotype Printing Co. Boston

Eye-bars.—The bars for swivel connection to be of square or round iron as shown, the full size to be carried round the loops which shall be well and truly formed and welded.

The swivel ends of bars to be up-set and forged round and to have right and left hand thread cut so that the sectional area at the root of the threads shall equal the area of the bars. All eye-bars must be free from flaws, of full and uniform thickness, and perfectly straight before being bored. The pin holes must be in the centre of the head and on the centre line of the bar. The bars must be bored to exact lengths and the pin-holes not more than 1-64″ larger than the finished diameter of pins. Each bidder must state his mode of manufacture of eye-bars.

Pins.—All pins to be turned straight and smooth and to fit the pin-holes to within 1-64″; the diameters of the pins, as noted in the drawings, are the nominal diameters; the finished or turned diameters to be 1-16″ less; the ends of all pins to be turned down to take the nuts to a diameter 1-2″ less than diameter of pin; the nuts, unless otherwise shown, to be 3-4″ thick hexagonal, and have a short diameter 1″ greater than diameter of pin; the threads to be eight per inch; the spools for pins to be wrought-iron pipe, the inner diameter of which to be 1-4″ greater than diameter of pin.

Jack Rafters.—All jack rafters between trusses to be framed into beam purlins, which must be substantially secured to trusses; all rafters and hips to have wrought-iron angles riveted to webs for footing up and anchoring to bearing-plates, which must be secured to walls by expansion-bolts. All framing for beam purlins, jack and hip rafters, deck beams, etc., to be made by angle-irons properly shaped for fitting; fish-plates, etc., secured in place by rivets and bolts of standard sizes, as specified for floor framing. All joints and mitres of beams, channels, bars, angles, etc., must be cut clean and accurate to the proper and true angle and fitted closely. [It is usual to rivet all work which can be done at the shops; the remainder is generally put together with bolts.]

Rivets.—All rivets used throughout the work, not otherwise noted, shown or specified, to be 5-8″ and 3-4″ diameter as required.

All rivet-holes must be accurately punched or drilled so that the pieces to be connected shall permit of being riveted without the use of drifts.

All rivets to have "cup heads," except where countersinking is necessary and all rivets must completely fill the holes.

Shape Iron.—The contractor will not be limited to shape iron furnished by any particular mill and variations from the shapes shown by the drawings will be allowed provided the sectional area is not diminished; such changes, however, must receive the approval of the Supervising Architect before being carried into effect and no additional compensation shall be claimed or allowed therefor.

Tension Members.—The tension members of trusses, etc., must be of the best quality, double-refined iron and finished bars must be thoroughly welded in the rolling and free from injurious seams, buckles, blisters, cinder-spots and imperfect edges.

Specimens for Tests.—The successful bidder will be required to provide for testing, without extra charge, specimens of the iron, about six in all, which he proposes to use, shaped according to a diagram which will be furnished, and no iron shall be worked into members of the roof, etc., until after specimens shall have been tested and the quality of the iron approved by the Supervising Architect. The specimens or test-pieces will be about 16″ long, with area reduced to one-half square inch for a length of 10″ and the elongation, as noted below, shall be measured for a length of 8″.

The following table shows the ultimate strength and elongations which the different kinds of iron will be required to show when tested in specimens of the sectional area and length as above specified.

Specimens of	Ultimate Tensile Strength	Elongation in a Length of 8 in.
Flats, rounds and squares..................	50,000 lbs.	18 to 20 per cent.
Angles and other shaped iron............	50,000 "	12 " "
Plate iron..............................	45,000 "	10 " "

All rivets and pins must be of the best quality, doubled-refined iron.

All tension members made by welding the eye to the bar shall be tested to a stress of 20,000 pounds per square inch before being accepted by the Government.

The contractor will be required to furnish facilities for the inspection of the iron and workmanship to the duly accredited agent of the Government.

If it be deemed necessary to cut specimens for testing from finished pieces of the structure, such finished piece will be paid for at cost; but should the iron so tested not withstand the required tests, it will be considered as rejected, and no compensation therefore will be allowed.

Purlins.—The entire iron framing of roofs, steep portions, decks, roof and sides of dormers, etc., to have rolled-iron 2″ x 2″ x 1-4″ ⊥-bar purlins spaced generally 16″ apart secured at each bearing with 3-8″ diameter rivets, where purlins abut masonry, 2″ x 2″ L irons for supporting the ends of them to be bolted with 3-4″ x 6″ expansion bolts 4′ apart.

WROUGHT AND CAST IRON ROOF TRIMMINGS.

Gutters.—Gutters with the crown mould of cornice are frequently made of cast-iron 3-8″ thick, the bottoms to be graded to drain water to outlets and to extend up under the eaves of slate or roof covering and secured to ironwork of roof by bolts, and the crown mould secured to stone or brickwork by expansion bolts 5-8″ diameter every 3′ apart, outlet hoppers to be cast with the section of gutter at points noted to connect with 4″ diameter down piping, they should be cast in form 6′ to 8′ lengths and all joints lapped 2″ made flush and the sections fastened together with countersink screws or bolts.

Hips, Ridges, etc.—Deck cornices, hips, and ridges are frequently made of cast-iron 3-8″ thick with the necessary stiffening ribs spaced about 3′ inch apart, to be made to fit closely to slate or roof covering, all cross joints to lap 2″ made flush and the work fastened together and to brackets by 1-2″ diameter countersink bolts or screws, the brackets to be cast-iron with 3″ wide spaced about 3′ apart and bolted to the iron framing of roof.

Scuttles are usually made of frame of boiler plate iron 1-8″ thick or cast-iron 3-8″ thick with angle-irons riveted or bolted in corners and to bottom edges and the angle-irons bolted to roof beams with 3-8″ diameter bolts, the cover to be of galvanized sheet wire No. 16 B. W. G. riveted to 1 1-2″ x 1 1-2″ angle-iron frame and to be hung and provided with heavy wrought-iron hinges, hasps and staples securely riveted or bolted.

Ventilators.—Generally Emerson's ventilators or Hayes's ventilating skylights are used, the frame-work is constructed of angle-irons or where very large, of small rolled-iron beams securely riveted or bolted at all connections with from 3-8″ to 5-8″ diameter bolts, the base louvres and roof to be No. 16 (or 20) B. W. G., galvanized sheet-iron lapped 1 1-2′ and riveted at all connections and riveted to framing, and rafters. The roof and part of the sides of Hayes's ventilating skylight to be provided with heavy ribbed glass from 1-4″ to 3-8″ thick.

Skylights.—The small skylights are generally made of Hayes's standards as shown in his illustrated catalogue, the supports for same to be 3″ x 4″ angle-irons framed with angles and rivets and bolted to iron roof framing or to brick walls by expansion-bolts, the skylights generally have a curb about 6″ high above roof.

Cresting and Finials, are generally made of wrought-iron, but frequently cast-iron; the different sections should be thoroughly secured together by rivets, wedges and bolts and also secured to the ridge beam or purlins and securely braced using wrought knees, angle-irons, rods, etc., as may be necessary. All joints in exposed cast-iron work to be made water-tight by using red lead, elastic cement or other approved substance. All holes in cast-iron work for bolts or screws must be drilled.

STAIRS.

The stringers and trimmers to be wrought-iron beams and channels as shown, all securely framed together and to bearing plates with standard angle-irons and bolts. Bent carriage-beams to be used where shown. The wall stringers to be channel-irons bolted to brickwork with 3-4″ x 6″ expansion-bolts 3′ apart. The wall bearings for beams and channel-irons to be at least 8″, resting on plates 8″ x 12″. Bracket step carriages to be cast-iron 3-8″ metal 3″ wide flanges of various shapes and dimensions required. Brackets for casings to be about 2′ apart. Each bracket to be bolted to stringers, with 2 1-2″ bolts. The risers, casings, newels-posts, balusters, etc., to be of cast-iron of the thickness and design shown all securely fastened to supports. All ornamental cast-iron work to be fine stove castings of designs shown on de ail drawings. All mitres in cast-iron work to be properly faced to insure a perfect joint. The holes for bolts and screws to be drilled. No wood blocks or wedges to be used.

The rolled-iron required for framing to be of American manufacture and subject to same tests as specified for other structural ironwork. Iron balusters to be firmly secured, as shown, to support and to core-rail above. The core-rail to be 1 1-4″ x 1-4″ drilled and countersunk every 12″ apart for screws to secure handrail. Handrail to be of mahogany, walnut or oak closely bolted at joints and finely polished. The treads and platforms to be of dark blue or purple slate 1 1-2″ thick rubbed on all exposed sides and edges, of shape, and secured, as shown on drawings: the treads to be in one piece each: the platform to be jointed if necessary over the trimmers as shown on drawings. The soffits of stairs and platforms to be furred with angle-irons to the lines required and lathed with approved iron laths ready for plaster, or where panelled soffits are shown the mouldings to be executed in cast-iron 1-2″ thick and the flat panel in galvanized sheet-iron all securely bolted in places.

Where treads and platforms are made of cast-iron they are to be diamond-channelled or checkered on top, the channelling to be raised 1-8″ and to have a smooth margin of 1″ all around.

The wall skirting of stairways to be cast-iron to follow the line of treads and platforms and to start and stop on landings against the architraves of the nearest door, to be made in strict accordance with details and have stiffening ribs every 2′ and fastened to walls with 3-8″ diameter x 8″ long countersunk expansion-bolts 3′ apart and to iron-work where necessary with top bolts or screws.

Spiral stairs to have treads, risers and section of newel cast in one piece and built around a wrought-iron pipe and each step secured to same by top screws; the balusters to be thoroughly screwed to treads and to railing.

Step-ladder from attic floor to scuttle in roof to be constructed of two 6″ channels for stringers secured at bottom with 3″ x 3″ angle-irons and two 9″ long x 3-4″ diameter expansion-bolts. The treads to be white oak 1 1-4″ thick resting on angle-irons 3″ x 3″, riveted to stringers, by two 5-8″ diameter rivets, and the steps secured to angle-irons by three wood-screws to each angle.

Wrought-iron gratings to be provided for small window areas, the frame to be 2″ x 3-8″, let into stone coping and have 3″ bearing, the bars to be 1 1-2″ x 1-4″, swaged into frame and held apart in centre by iron spools with rod passing through.

FENCES.

Iron fences are generally placed on the street fronts of Government buildings; on the rear and side either wooden board fences or brick walls are built.

Iron fences are usually built on top of stone copings or on stone blocks set about 18″ in the ground for each post to rest on. The posts, rails, pickets and ornamental work between pickets are made of wrought-iron; the posts are generally spaced 6′ to 8″ apart and are made 1 3-4″ square, with small posts 1″ square, about 1′ to 2′ apart; the main posts and each alternate small post to have cast-iron collar on boss fitting coping and are leaded into stone coping 4″, the small posts, which are not leaded, to stop at top of stone, the bosses to be fastened to post by 3-8″ diameter countersunk tap-screws; the small posts pass through the rails and are swaged thereto. The rails (generally three) to be 5-8″ x 1 3-4″, the ends bent at right angles and fastened with two 3-8″ diameter bolts to large posts; all ironwork, where necessary, to be let into stone coping, posts or wall of building at least

4″, leaded and caulked tight; the scrolls and ornamental work to be secured to rails and posts with 3-8″ diameter rivets (or screws where rivets cannot be used) and to stonework with 3-8″ x 4″ bolts.

Sometimes cast-iron posts are used. They are generally made 4″ square, 1-4″ thick, placed 8′ to 10′ apart, and are set in the ground about 18″, having a cedar post driven firmly in the hollow base of post and set in the ground from 3′ to 4′; the rails to which the intermediate posts, pickets and ornamental work are secured are fastened to the cast-iron posts by tap-screws or bolts. The gates for entrances to driveways and interior walks are made of wrought-iron with scrolls, ornamental panels, braces, etc., and riveted with round-head rivets. The stanchions to which the gates are hung to be wrought-iron let into stonework 6″ and the brace fastened with 1-2″ diameter x 4″ long expansion-bolts with hexagonal heads; the double gates have a bolt on standing leaf which is to be dropped into hole in stone gate-stop; the other leaf of double gates and the small gates are to have approved stops, hasp, staple and latches for fastening; the double gates to have spring catches secured to stone blocks to hold them when open.

Ornamental iron grilles are usually made of wrought-iron (sometimes cast) and have a frame of 1 1-4″ x 1-4″ secured to masonry by 1-2″ diameter x 3″ long expansion-bolts.

For steps and platforms at mail entrance and on coping of basement-entrance area, is provided a railing, the posts about 4′ apart and from two to three rails, all of wrought-iron 2″ diameter gas-pipe, with cast-iron beaded fittings secured to rails by tap-screws; frequently the pipes are screwed into fittings as far as practicable; the post to have a cast-iron boss secured to stone by 3-8″ diameter x 6″ long expansion-bolts and the posts fastened to boss by three 3-8″ diameter tap-screws.

Iron partitions are made of studs spaced 16″ on centres, sills, and cap, all of 4″ light channels or I-beams framed and secured together by angle-irons, rivets and bolts; the end pieces, sill and cap are secured every 6′ to masonry by expansion-bolts.

Lattice partitions for vaults are made of steel; three and five ply welded steel and iron and iron bars 1″ x 1-4″ or 3-8″ spaced 4″ on centres and inclined at an angle of 45°, the sides, bottom and top to be riveted in between angle-irons 1 1-2″ x 1 1-2″, and the angle-irons secured to steel lining of vault by tap-bolts 8″ apart or to masonry by expansion-bolts 8″ apart on alternate sides of partition.

Illuminating tiling is used in sidewalks to give light to vaults and frequently in the first floor to give light to the interior of basement.

The curbs or frames are made of cast-iron, with ribs and flanges and fastened to beams, etc., properly framed for same with bolts or screws, the top being flush with floor or sidewalk. The tiles are made 1 1-4″ thick and the glass lenses 3″ to 4″ across, either circular or hexagonal, smooth on top; the spaces between lenses are filled in with Portland cement or other approved substance. Sometimes small lenses about 2″ diameter are set into iron frames and leaded.

Painting.— All iron work to be cleaned of scales and dirt and to receive one coat of metallic or red-lead paint in oil before leaving the shop.

All pins, pin-holes and machined surfaces must be coated with white lead and tallow before being shipped, in riveted work all surfaces coming in contact to be painted before being riveted; bearing and other surfaces not accessible for painting after erection to receive two coats of paint before leaving the shop.

After erection and completion, all the ironwork to be thoroughly and evenly painted, one coat of metallic or red-lead paint mixed with pure linseed oil.

Vault Doors. — Vaults in Government buildings a few years back were generally lined with steel, single steel lining 1 1-4″ thick, or double steel lining 2″ thick; this is seldom done now, but fire and burglar proof vault doors are provided for the vaults which are generally located in the interior of the building, and enclosed in solid brick walls, the doors are generally 3′ x 7′ and 3″ thick, built of alternate layers 1-4″ thick of welded steel and iron, secured together with rivets, screws, twisted iron and conical shaped bolts; the edges of doors and their repective jambs are constructed with steps, tongues and grooves perfectly fitting each other: the doors are provided with 2″ diameter bolts made of cold rolled shafting-iron (usually 8 bolts) and the hinges made of wrought-iron with steel-pins: the frames for the doors are construeted of wrought-iron or steel, the jambs are made the full depth of brick walls and secured by 3-4″ diameter expansinn-bolts spaced 12″ apart.

The locks used are combination locks, generally the combination time-locks manufactured by Sargent & Greenleaf.

The inside door of vault is made of boiler-iron, arranged and hinged to open in the jambs with the necessary bolts and a tumbler-lock opened with a key; these are usually called day doors.

MEASUREMENT.

Most all ironwork is estimated by the pound· ornamental ironwork such as stairs, fences, grilles, crestings, finials, etc., of course is dependent mostly upon the design for the cost. Cast-iron is generally estimated at 450 pounds, and wrought-iron at 480 pounds per cubic foot, the unit is generally taken as a square foot 1″ thick weighing 37 1-2 pounds for cast-iron and 40 pounds for wrought-iron.

The actual volume should be taken deducting all holes, except those punched or cut out for bolts, rivets, etc.; for rolled-iron all the weights per lineal foot or yard are given by the rolling-mills' hand-books, and the weight is obtained by simply multiplying by the length of the piece.

Iron girders carrying only floors, weigh from 60 pounds to 100 pounds per lineal foot, and carrying ordinary walls and floors for a two or three story building from 130 pounds to 200 pounds per lineal foot, seldom as high as the latter, these of course are dependent upon the loads and spans.

Floor-beams for a small building will average 5 pounds to 6 pounds per square foot of floor area, and for a large building 6 pounds to 7 pounds per square foot.

Iron roofs without trusses but including purlins will weigh from 8 pounds to 10 pounds per square foot of roof area, and including the average number of trusses about 12 pounds. The iron roof for the Government building at Nashville, Tenn., which had a great many trusses averaged 14 pounds per square foot.

COST.

The cost of iron is so changeable and is dependent upon so many causes that scarcely any general approximate data can be given. In the past few years it has varied in price from 6c. to 2c. for cast-iron and from 8c. to 3c. for wrought-iron. In estimating cast-iron, the cost of making patterns and whether they can be used for one or more articles must be taken in account. Rolled-iron and plain cast-iron can be estimated at the rates given in the quoted weekly price lists. Ornamental ironwork can be estimated correctly after careful experience.

Cast-iron bed-plates, cost from	1 1-2c.	to 3c. per pound.
Cast-iron columns, etc., cost from	3c.	to 5c. " "
Rolled-iron beams, channels, etc., cost from	4c.	to 7c. " "
Iron roof construction, cost from	6c.	to 10c. " "

Iron stairs for public stories, including ornamental balustrade cost from $30.00 to $45.00 per step.

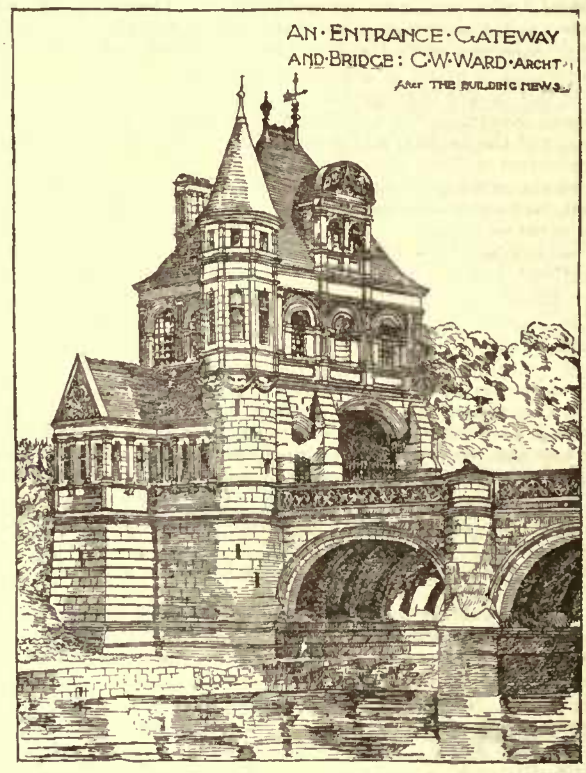
Grilles and window screens cost from $1.00 to $2.00 per square foot, up.

Iron fences with posts 7′ to 8′ apart, with wrought-iron pickets, rails, scrolls, etc., cost from $2.50 to $3.00 per lineal foot.

Pipe railing, cost from $1.00 to $1.50 per lineal foot.

Jas. E. Blackwell.

GENERAL Q. A. GILLMORE.



Of General Q. A. Gillmore, who died April 7th last, the New York *Times* says:

Historians and biographers have written of Gen. Gillmore that he was the greatest artillerist and one of the greatest engineers in the war of the rebellion. He was born at Black River, Lorain County, Ohio, Feb. 28th, 1825. His father, Quartius Gillmore, a farmer, moved to Ohio from Massachusetts in 1811, becoming one of the pioneers on the "Western Reserve." He was born on the day on which the news of John Quincy Adams's election to the Presidency was received at Black River, and his father expressed his gratification at the result by naming his first-born after the President. The boy's early years were all spent on his father's farm, his only "schooling" being obtained during three months in winter. When thirteen years old he was sent to the Norwalk Academy, twenty-five miles distant from his home. Here, in a few years, he was made a teacher, with some of his former classmates for pupils. Later he entered Elyria Academy, where, in 1845, he secured first place in English composition by writing his first and, as far as known, his only poem. This production attracted the attention of the Hon. E. S. Hamlin, Member of Congress for the district, and he offered young Gillmore a cadetship at West Point. The student accepted it. Before his first year with his class had closed he was its leader in mathematics, and in 1849 was graduated at its head. In the year of his graduation he married Miss Mary O'Maher of West Point.

His high standing in his class determined the nature of his assignment to duty, and he was made Brevet Second Lieutenant in the Corps of Engineers. He served as Assistant Engineer in building Forts Monroe and Calhoun, for the defense of Hampton Roads, Va., from 1849 to 1852. In the latter year he was ordered to return to

West Point to act as assistant instructor of practical military engineering. Sept. 5th, 1853, he was given his commission as Second Lieutenant of Engineers, and was Treasurer and Quartermaster of the Academy during 1855 and 1856. July 1st, 1856, he was commissioned a First Lieutenant in his corps, and was again sent to Fort Munroe, to act as assistant engineer in the construction of the works there. In a few weeks, however, he was given charge of the engineer agency in New York city, and he also had charge of the work of supplying and shipping materials for the fortifications. During 1857 and 1858, Lieut. Gillmore had charge of the fortifications in New York Harbor, and he remained in control of the Engineering Agency until the breaking out of the war in 1861. During his later years at the Military Academy, from 1852 to 1856, he made many experiments with round-shot projectiles against masonry. During his control of the New York Harbor fortifications and the Engineering Agency he experimented extensively with limes and cement, with especial reference to their use in the masonry of fortifications.

Lieut. Gillmore applied for active duty in the field in August, 1861, and he was at once called upon to fit out the expedition against the coast defenses of South Carolina. He was made Captain, and Chief Engineer to Gen. W. T. Sherman. In November and December, 1861, he succeeded in fortifying Hilton Head, and then the attention of the corps was directed towards Savannah. Fort Pulaski, situated on a marshy island, covered both channels of the Savannah River, and its demolition was necessary in order to render the approach of Union vessels to the city possible. The oldest and ablest engineers in the service declared that, owing to the peculiarly marshy or slimy condition of the land on the coast, upon which guns could not be placed, it would be absolutely impossible to subdue the fort — that, in fact, it was impregnable.

Late in November Capt. Gillmore was ordered to make a reconnoissance of the locality, and two days later reported that he deemed the reduction of Fort Pulaski practicable by means of batteries of mortars and rifled guns placed on Tybee Island. He would require, he said, 10 10-inch sea-coast mortars, 10 13-inch sea-coast mortars, 8 heavy rifled guns, and 8 columbiads. This proposition was received with astonishment by Capt. Gillmore's superior officers, and was treated with ridicule by some of the older engineers of the corps. Tybee Island was something over 1,700 yards from Fort Pulaski, and the limit for the practicable breaching of masonry forts was then generally supposed to be 1,000 yards; in fact, the limit was considered to be from 600 to 700 yards, excepting under peculiarly favorable circumstances. Even at these distances from four to seven days' firing, with considerable artillery, was considered necessary in order to render a breach practicable. Capt. Gillmore was unable to quote any authority for his belief that Fort Pulaski could be breached at a distance of 1,700 yards, and had only his theoretical ideas and his experiments to give him assurance. The position of the fort was such, that Gen. R. E. Lee, in the winter of 1861, notified the commander that he had nothing to fear from Tybee Island, as it was not within even dangerous distance. Capt. Gillmore, however, believed that the capacity of rifled guns had not been fully appreciated. Gen. Totten, the venerable head of the corps, frowned upon the young captain's scheme as visionary. The general commanding, however, while not fully convinced of the wisdom of the scheme, determined to let him try it, so he endorsed the plan and sent it to Washington. Six weeks later a reluctant consent was given, and operations were begun.

In order to cut off communication between the fort and Savannah, it was necessary to place batteries on the shore of the river above the fort. The coast was a marsh filled with mud and slime from two to twenty-five feet deep, yet the heavy guns of the battery were transported across it for four miles to Venus's Point, on Jones's Island. The transportation was accomplished by hand power over a wheelbarrow track of plank. This, of itself, was considered to be a most remarkable feat of engineering, but, the battery once established at Venus's Point, Fort Pulaski was isolated. The Confederate garrison did not obtain an inkling of these operations, which were carried on by night and by day. Tybee, like Jones's Island, was a marsh full of slimy mud, but there were solid ridges on the former at intervals, and to these the heavy guns were transported in the same manner as in the latter place. Although the island was in full sight of the fort, the operations of Capt. Gillmore's force were so carefully conducted that the garrison knew nothing of what was going on.

When the batteries were all in position extending in an arc for 2,550 yards, Gen. Sherman determined that Capt. Gillmore should have all the honor of success, or bear all the burden of failure, and he accordingly authorized him to act as Brigadier-General, in the meantime soliciting the appointment for him from the President. Thenceforward Gen. Gillmore had all the details in his own hands. He gave detailed instructions to the gunners as to range, elevation, and intervals of fire, and on the evening of April 9th, 1862, issued his order for the bombardment. On the morning of the 10th, the firing began. It was soon found that the smooth bores, mortars, and columbiads were useless at the distance for the purpose of making breaches, but the rifled guns soon began to have a telling effect upon the fort, while the responses from the garrison did not come anywhere near the Union batteries. Before night a breach was almost effected, and by two o'clock the next afternoon the fort, in a dilapidated condition, was surrendered to Gen. Gillmore. This achievement created a sensation throughout this country, and, in fact, all over Europe, for it rendered vulnerable half the fortifications of the world. Gen. Gillmore's provisional appointment as Brigadier-General was confirmed by the President, and soon afterward he came home to New York on sick leave, having been attacked by malaria. In October, he was assigned to command the district of Central Kentucky. Here he defeated Pegram at the battle of Somerset, and drove him across the Cumberland. For this he was brevetted Colonel of Engineers.

Later in the same year, Gen. Gillmore accomplished some brilliant artillery exploits in the bombardment of Charleston, for which he was highly commended in the annual reports of the General-in-Chief. Soon afterward he was made a Major-General of Volunteers. He acted for a time as Inspector-General of the fortifications of the military division of West Mississippi, and in January, 1865, was given command of South Carolina. He resigned his volunteer commission in December, 1865, and in 1866, was made a member of the Special Board of Engineers to conduct experiments in connection with the use of iron in the construction of permanent fortifications. He served as superintending engineer of the fortifications on Staten Island, from 1866 to 1869, and also, for several succeeding years, of the works along the Atlantic coast south of New York City. He was made a Lieutenant-Colonel of Engineers, June 13th, 1874, and conducted many notable military enterprises on the Atlantic and Gulf coasts. He was one of the judges at the Centennial Exhibition, in 1876, and was President of the Mississippi River Commission in 1879. He has since then been a member of numerous commissions appointed by the Government for the purpose of making military tests.

The degree of A. M. was conferred on Gen. Gillmore by Oberlin College, in 1856, and that of Ph. D. by Rutgers College, in 1878. He was the author of "*The Siege and Reduction of Fort Pulaski*," of a "*Practical Treatise on Limes, Hydraulic-Cements, and Mortars*," of "*Engineering and Artillery Operations against the Defenses of Charleston*," of "*Béton Coignet, and Other Artificial Stones*," of works on the strength of building-stones of the United States, and on roads, streets, and pavements.

One of his biographers says of Gen. Gillmore's military record: "He made himself the first artillerist of the war, and if not also the first engineer, he was second to none. In the boldness and originality of his operations he surpassed any similar achievements, not only in this war, but in any war. Notwithstanding the varied operations around Richmond, Atlanta, and Vicksburg, when men speak of great living engineers, they think as naturally of Gillmore in the New World, as of Todleben, in the Old."

STREET-WATERING WITH SEA-WATER.

TOFT MONKS,-NORFOLK.

WHEN the world and his wife go down to the sea-side in summer they put a heavy strain on the resources of many a quiet town. They consume all the fresh butter and eggs, the milk, and the fruit produced for miles round, and, not least, they reduce the store of water at a speed which costs the local engineer many an anxious hour. They have come in search of health and pleasure, and for both objects they require plenty of water. The morning tub becomes an article of faith with them, even if they neglect it all the rest of the year, and the ablutions of the children are carried out on an unheard-of scale, while, if every atom of dust in the street is not laid, they write to the local paper, and threaten to give the place a bad name in the part of the country from which they come. This extra demand occurs at a time when there is but little rainfall to replenish the reservoir or underground store on which the town relies, and when the flushing of the drains and the watering of gardens is added to the usual requirements of the resident population. Fortunately, it only lasts a short time — so short that it renders the expenditure of large sums for providing storage a very unremunerative proceeding. Under these conditions it is curious that the unlimited sea supply has not been more often drawn upon. Twice a day it comes right up to the town, almost at the street level, and it can be used in the most lavish way without any danger of exhausting the store. For bathing purposes salt water is unequalled, while for such uses as flushing drains and watering roads it might be expected to answer perfectly

well. Unfortunately, the idea was at one time prevalent that for these two purposes sea-water was not applicable. It was demonstrated in the laboratory that the combination of sewage and salt water gave rise to the evolution of sulphuretted hydrogen, and from this it was argued that if it were admitted to the drains it would occasion a foul smell which would be perceived at every gully-hole, and would give the impression that the system of sewerage was defective. On the roads likewise the sea-water was credited with a disintegrating action. Consequently, in most of our coast towns sea-water was not applied to any municipal purpose. In some few, however, the surveyor was more enterprising, and by prolonged trial satisfied himself that none of the evils attributed to the use of sea-water were of any moment if reasonable precautions were observed. In the town of Ryde salt-water has been used for road sprinkling for thirty-five years; and there are several other towns where the practice has been more or less in vogue for some time. Recently the subject has attracted general attention in watering-places, and several schemes have been mooted for the local supply of sea-water. An account of those projects and also of existing works has been compiled by Mr. Stephen Harding Terry, and forms the subject of a paper read by him before the Civil and Mechanical Engineers' Society. From this paper, which is exhaustive of the subject, we learn that there is an almost universal concensus of opinion that salt water is superior to fresh water as a means of laying dust on flint, macadam, and wood roads. The borough engineer of Ipswich, Mr. E. Buckham, addressed inquiries to the engineers of thirty-five coast towns, asking their experience with sea-water. Twelve said that they were employing it, and two were about to build permanent works to render its use possible. Two, only, spoke adversely to its use on roads. The remainder witnessed that it had a binding effect on the surface, covering it with a skin or glaze quite different from the result of fresh-water sprinkling, and so permanent that only about half or one-third as much water was required. The engineer of Ryde, however, stated that too frequent applications of salt water rendered the streets slippery, and that in very hot weather an occasional application of fresh water was needed. In only one place has any complaint arisen in connection with the flushing of the drains, and Mr. Terry suggests that if the drains were foul, flushing of any kind would stir them up and give rise to unpleasant effects. It may, however, be assumed, we think, that when sea-water is used for flushing it should be applied only at suitable times, when it can sweep right through to the outfall, and that it should not be allowed to lie in contact with sewage in a drain which is sealed by the rising tide.

To render the use of sea-water really economical it must be supplied through the town by a system of mains, with hydrants for filling the carts and flushing-tanks. Such works have been carried out in several places at a very moderate cost. At Great Yarmouth they cost 4500*l*., and consist of an 8 horse-power Crossley gas-engine, a 12-inch pump, a tower and tank containing 22,000 gallons, a settling-tank, and a suction-pipe to the jetty. There are 900 yards of main varying from 3 inches to 8 inches, 40 stand-pipes, and 12 automatic flushing syphons of 2000 gallons capacity each. The total expenses, including interest on capital, repayment of loan in twenty years, depreciation, wages, gas, oil, etc., are under 500*l*. per annum. For this amount some 30 million gallons are raised 44 feet at the cost of 4*d*. per 1000 gallons. Of this five million gallons are used for street watering and 25 million gallons for sewer flushing. The annual cost to the inhabitants is rather less than a penny in the pound on the assessment. The borough engineer states that since the works were completed the saving in purchase of flint and gravel has been 300*l*. per annum, and will be greater. The distribution costs less by 100*l*. a year in consequence of a less volume sufficing, and the roads are better watered, while the flushing of the sewers is well worth the whole cost of the works.

Littlehampton, in Sussex, completed its sea-water works last August. The tank holds 20,500 gallons and can be filled in three hours by a pump driven by a two horse-power gas-engine. There are 900 lineal yards of mains and three drawing-off stations. The cost was 850*l*., and the total annual expense is 150*l*., including repayment of loan. This is equal to 1¾*d*. the pound of the rentable value. Hastings has spent 9000*l*. on its work, and the height of the reservoir is sufficient to render the water available for fire purposes.

The experience already gained demonstrates that for an addition to the rates of a penny or two-pence in the pound, a seaside town can put itself into the position of being able to water its roads without stint through the longest and hottest summer, while its sewers may be flushed out most thoroughly. There are besides the collateral advantages of a total saving of the fresh water formerly used for these purposes, of an economy in the upkeep of the roads, and in the attraction offered to visitors of having salt water laid directly to the bath-rooms of the houses. This last is, in itself, a considerable addition to the attractions of a watering-place. There are plenty of people who are wishful to enjoy the bracing effect of sea-water, but who do not care to undress in a ramshackle box on wheels, and disport themselves in scant attire among the waves while an idle crowd on shore while away the forenoon in criticism on their want of agility, and in the threatened obesity of their forms. For strong swimmers and youth of both sexes conscious of possessing good figures, the outdoor bath is full of delights, but the choice of a place to spend the summer holiday lies with the heads of a family who have partly lost their zest for outdoor pursuits, while they are the more eager to conserve their health, since it shows signs of giving way. A domestic sea-water supply would often cause such people to give one watering-place the preference over another. — *Engineering.*

ESTIMATES.

OF all the "royal roads" to learning in popular demand among those connected with architecture and building, none is perhaps more ardently desired than a quick method of estimating. The editor of any architectural journal will know how frequently the question is asked, "How can I estimate the cost of a building without taking the trouble to figure out all the material and labor involved in its construction." The answer is, that there is no way if an accurate estimate be required.

But when it is only desired to obtain an approximate estimate of cost, the method known as "cubing out" is to be recommended. This method is simple, indeed very simple, but it needs not a little judgment and some amount of experience in its application.

Suppose that a building of a certain class costs to erect in a particular location such and such a sum, then a building of the same class and in the same position, but of double the size, would cost approximately double the amount. In other words, the cost of a building is (within certain limits) in arithmetical proportion to its size. This gives the key-note of the principles of cubing out. Having ascertained the cubical contents of a building by measuring from one-half way up the height of the roof to one-half way down the depth of the foundations and multiplying by the length and breadth of the structure, the number so obtained is multiplied by the value of a single foot, and so an approximate estimate of the cost of the whole building is obtained.

It is clear enough that the value placed upon the single unit foot practically determines the whole result. To obtain these unit values in different classes of buildings and in all manner of locations will be the first aim of any one wishing to employ the method. This is best done by figuring on work actually executed. Take, for example, the drawings of several of the ordinary tenement-houses of which the cost is known. Figure out the cubical contents, divide the cost and so obtain the average cost price of the unit foot of such a building. Whenever it is desired to obtain an approximate estimate of the cost of building similar flats, these figures will, by a simple calculation, always give the result. Of course, when there are any special circumstances surrounding the particular case tending either to raise or lower the price as, for instance, local difficulties of construction on the one hand or abundance of materials on the other, due allowance must be made.

The value of cubing out is greater than is ordinarily recognized. The few figures upon which it is based are so easily remembered that it is almost surprising that it is not more widely used. Ninety-nine out of a hundred buildings are designed within specific limits of cost, and to obtain at the outset the maximum capacity in cubic feet will be a material help in the subsequent proceedings.

A good plan is to form a tabulated list of prices obtained by figuring on work actually executed. Thus we might have "flats first-class," "second-class," and so on. Private residences and cottages of various grades, office-buildings, churches and chapels, schools, etc., where deemed advisable a number of columns might be assigned to indicate the cost of the particular description of building in different cities. ARTHUR SEYMOUR JENNINGS.

CAROLINA CLAY-EATERS.

IT has been a matter of speculation for years as to why the "poor white trash" of central North Carolina ate the clay that is found in that part of the country. It remained for a Philadelphia physician to solve the mystery. A short time ago Dr. Frank H. Getchell, of 1432 Spruce Street, went on a gunning expedition to North Carolina. His quest for game led him into the wild country back of Salisbury, which is inhabited, for the most part, by a miserable race of beings with only just enough energy to eke out a wretched existence, These creatures are nearly all veritable living skeletons, and with few exceptions, are addicted to the habit of clay-eating.

While shooting wild turkey and other game in this wild region, Dr. Getchell made an incidental study of this peculiar habit or vice among the inhabitants. It is a mountainous country, and in the spring little rivulets start out from the caps of snow on the mountain, and as the days grow warmer, the little rivulets become torrents, and great wash-outs are made along the mountain side.

The soil is of a heavy clayey nature, but there are strata of clay that is heavier than the rest, and when the water rushes down, this clay is formed into little pellets and rolls and accumulates in heaps in the valley. These little pellets and rolls are what the clay-eaters devour with as much avidity as a toper swallows a glass of whiskey.

"Among the poor people of this section," said Dr. Getchell, "the habit of eating clay is almost universal. Even little toddlers are confirmed in the habit, and the appetite seems to increase with time. While investigating the matter, I entered a cabin occupied by one of these poor families, and saw a little chap tied by the ankle to the leg of a table, on which was placed a big dish of bread and meat and potatoes within easy reach. The child was kicking and crying, and I asked his mother why she had tied him up. She replied that she wanted him to eat some food before he went out to the clay and he

refused to do so. The woman confessed that she ate the clay herself, but explained that the child's health demanded that it eat some substantial food before eating any earth. Almost every one I met in this section was addicted to this habit. They were all very thin, but their flesh seemed to be puffed out. This was particularly noticeable about the eyes, which had a sort of reddish hue.

"All of the clay-eaters were excessively lazy and indolent, and all of these conditions combined led me to the conclusion that there must be some sedative or stimulating qualities, or both, in the clay, and I determined to find out whether there was or not. I consequently brought a lot of the clay home with me, and Professor Tiernan and myself made an analysis of the stuff, and discovered that, instead of clay-eaters, the inhabitants of central North Carolina should more properly be called arsenic-eaters. All of this clay contains arsenic, but exactly in what proportion we have not yet discovered. Arsenic-eating is common in many parts of the world, and is practised to a greater or less extent throughout the world. It acts as a sedative and also as a stimulant. The mountaineers of Styria, Austria, are habitual arsenic-eaters. They give as their reason for eating it that they are better able to climb the mountains after eating the poison, and their explanation is a perfectly reasonable one, as arsenic acts as a sedative to the heart's action. The habit is also prevalent in the Tyrol and in the Alps.

"It is also said that the peasant girls of Switzerland and parts of Germany and in Scandinavia eat arsenic to give luster to their eyes and color to their cheeks, but this is a matter I have not investigated. It has been shown that arsenic or arsenical fumes are a sure cure for intermittent fever. The inhabitants of a section of Cornwall, England, at one time suffered with this type of fever, but when the copper-works were established there, the fever disappeared. This was accounted for by the arsenical fumes created in the treatment of copper. As to whether arsensic-eating shortens life I am not yet prepared to say, but I intend investigating the matter thoroughly." — *The Clay Worker.*

A CELEBRATED ART MANUFACTURER.

EVERY one knows the pictures of M. Van Beers, and not a few admire them; years ago he painted in the manner of his master Leys, and gave us vivid bits of color, as in his long processional work representing the funeral, I think, of the Emperor Charles V, then, at a later *Salon*, about 1873 or 1874, artistic Paris was enchanted by a boy in yellow and black — powerful, masterly and notable. But although we artists liked these things, they did not impress the public; so M. Van Beers struck out in a new line, and gave us a dainty little lady in pink, sitting on a park bench — I think it was called "Le Soir" — a background of trees, a carriage and pair drawn up in the distance, and a sky reddened by the afterglow, made up a charming little picture, had it not been spoiled by the somewhat *outré* dress of the girl. This picture was a success, attributed evidently by the painter, to the high-heeled shoes and silk stockings, for henceforth M. Van Beers devoted himself to these accessories. Paris talked of nothing but Van Beers's tiny pictures, and Bond Street also took him up. When notoriety waned, an action for slander, against some critic who called his pictures colored photographs, brought him before the public again. Badly hung one year at the *Salon*, Van Beers scratched the face of one of his diminutive damsels, and again he was much discussed. Then, here in London, we had an exhibition of masks, and tambourines, and other conceits, with sprawling ballet-girls in silk stockings and high-heeled shoes appearing upon the backs of sandwich men, and upon all the hoardings. Shillings poured into the coffers, and we felt that here was another type of cant to keep company with Doré's huge canvases, and other peoples' nocturnes, dots, spots and symphonic harmonies. And what is the end of it all? — for let us hope it is the end. Here is the substance of a little tale of a *procés*, taken from *la Flandre libérale* of Ghent, giving charming revelations of the art-manufactory of the great master M. Van Beers.

Finding himself at Ostende, last August, the painter saw some works for sale, which he considered were forgeries of his own. Stupidly bringing an action against the dealer, the evidence at the trial was turned against himself. Two Paris artists affirmed that Van Beers kept some half-dozen painters constantly at work, as his "ghosts." Sometimes he put a few finishing strokes to the pictures, and generally he signed them. The original agreement was that the copyists were to receive half-payment — but this promise was not kept, and the help seem to have been paid like other "hands" in a factory. The atelier Van Beers, situated in Paris, was absolutely nothing but a manufactory of pictures — this is the painter's own admission! and this is the man whose pictures have been the fashion! Colored photographs? who can tell? But it is proved that much, signed Van Beers, is merely the work of Dewit, Semenowsky & Company, with a few finishing touches, and the signature of the putative author.

What a downward path for a man to travel! Excessively clever and original he has turned his cleverness to gulling the public. Not content with vulgarizing his works as advertisements of cigars, he must needs turn picture-making into a mere trade. It is to be hoped that the hanging-committees of all our exhibitions will show M. Van Beers the door in future; but we shall be curious to see in what guise such a master of invention will turn up next time, — for that he is crushed out permanently, there is little likelihood.

The career of Van Beers ought to be a warning to the public; but I suppose it is a vain hope to suppose for one moment, that shams and cant will ever be suppressed. When a painter is the fashion, he may paint boneless and colorless people like Puvis de Chavannes, or stockings and boots like Van Beers, or "dots and spots" like an eminent impressionist; or he may sweep some gray over a canvas and drop a few yellow specks about it and call it a "sonata," and surely every one will declare such works to be charming; but nevertheless, sooner or later, this particular cant gets exposed. That it is succeeded by another craze equally silly, one knows perfectly well; but still it is some slight satisfaction to feel that there is one less master of cant in the world. It is the age of eccentricities, and honest work does not "pay"; still, money is not everything in this world, and one would rather have starved as a Delacroix or a Millet, than have made a fortune as a Van Beers. S. BEALE.

COMMUNICATIONS

THE AMERICAN PUBLIC HEALTH ASSOCIATION.

STAMFORD, CONN., April 26, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — Will you kindly give me the address of the American Public Health Association, from whom I presume the pamphlets referred to in your editorial of April 21, 1888, can be obtained? I am much interested in the subjects of these essays and should like to obtain copies of them. Very truly, C. I. PAYNE.

[ADDRESS Dr. Irving A. Watson, Secretary, Concord, N. H. — EDS. AMERICAN ARCHITECT.]

THE COST OF SMALL HOUSES IN PARIS.

BALTIMORE, MD., April 19, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — In your paper of issue 27th of August, 1887, page 94, you refer to items of cost of small Paris house, details of which are published in *La Semaine des Constructeurs.* Will you oblige a subscriber by informing me the date of the issue of *La Semaine des Constructeurs*, in which this article appears, and also where same may be purchased in this country. May I take this opportunity to thank you for your very satisfactory publication and say with what pleasure I have renewed my subscription to the Imperial Edition, although only an amateur. I remain, dear sirs, yours very truly,

CLYMER WHYTE.

[WE are very sorry that we do not keep a long file of *La Semaine des Constructeurs*, and cannot refer to the number. As it probably is not on sale in this country we will say that the bureau of publication is 51 Rue des Ecoles, Paris. — EDS. AMERICAN ARCHITECT.]

MR. TARVER'S THEATRE PLANS.

NEW YORK, N. Y., April 25, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — In the 14th April issue is a clever editorial description of Mr. Tarver's efforts over the vexed theatre problem; based, I should judge, on a perusal of the plans. May I trouble you to advise me where a copy of these and a full description of the scheme can be obtained? thus obliging, Yours sincerely,

GEO. MARTIN HUSS.

[THE plans and description may be found in the *British Architect* of March 23, 1888. — EDS. AMERICAN ARCHITECT.]

BUILDING-MOVERS.

BARRIE, ONT., April 21, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — Please inform me through the columns of your paper, the names of some firms who would undertake the lowering of a brick church, 50′ x 90′ with tower in front about 70′ high. The walls are 25′ high, 18″ thick. The church is situated on a gravel hill and requires to be lowered about 6′. By doing so you will confer a favor on a SUBSCRIBER.

[ISAAC BLAIR & Co., 444 Harrison Ave., Boston, Mass., can handle large work satisfactorily. — EDS. AMERICAN ARCHITECT.]

CATHEDRAL LIGHTING BY ELECTRICITY. — Bristol Cathedral in England, is to be lighted by electricity. It will be used for the first time at a special evening service on June 8th, which is to be held in celebration of the completion of the western towers, when "Israel in Egypt" is to be given with a choir of six hundred voices and full orchestral accompaniment.

NOTES AND CLIPPINGS

THE FIRST OF SCENE-PAINTERS.—Loutherbourg was born at Strasbourg on Oct. 31, 1740, and came of an artistic stock, his father being chief painter to the Prince of Hanaudarmstadt. It was not the intention of his parent that he should follow art as a profession, but the hereditary bias came upon him so strongly while at the local college that his father pocketed his hopes and sent him to study painting under Carlo Vanloo at Paris. The wisdom of this course was speedily exemplified by the young artist's election as member of the French Academy in 1763 — a very signal honor, seeing that in bestowing it the association had infringed upon the rule that no one under thirty years of age should be received into their body. Not long after this Loutherbourg made an extensive tour through Germany, Italy, and Switzerland, painting as he travelled a large number of land and sea scapes and several battle-pieces, which brought him still more prominently into notice. His striking abilities as a battle painter, combined with an appropriate military appearance, earned for him many years afterward the amusing sobriquet of "Field Marshall Leatherbags," to which Jack Bannister stood an unblushing sponsor. Most of Loutherbourg's innovations at Drury Lane were largely due to the powers of observation brought into play during this period of Continental travel. In Italy he saw the practical outcome of the reforms attempted by the two Bibienas (great architects both), to one of whom Algarotti attributes "the introduction of accidental points, or, rather, the invention of viewing scenes by the angle," which, he adds, "produces the finest effect imaginable, but requires the nicest judgment to bring properly into practice." Equally important for us must have been the Parisian influence on the artist. Great attention was now beginning to be paid in the French capital to the hitherto neglected rules of scenic perspective, owing to the labors of the celebrated Giovanni Servandoni, whose services had been first acquired by the Opéra in 1726, and were retained there for close on twenty years. Apart from this the Chevalier was excellently well versed in the intricacies of stage mechanism, and is said, while in Paris, to have constructed a "Temple of the Sun," adorned with "eight thousand jewels set in revolving columns," the like of which, for extreme brilliancy, had never been witnessed before. Some of Loutherbourg's work at Drury Lane shows that he must have made a profound study of this kind of scenery in his early days. It is worthy of mention, however, that Servandoni had a more direct, if obviously slight, influence on the English stage. In praising a fairy palace scene in the Covent Garden pantomime of January, 1774, the *London Magazine* says it was one of those which "Servandoni prepared some years since, but not used." In all probability the Florentine had been induced to paint one or two scenes for the theatres when he came to London in April, 1749, to superintend the construction of the great firework machine erected in Greenwich Park in connection with the rejoicings over the General Peace. He died at Paris in 1766.—*The Gentleman's Magazine.*

NOT TAXED SINCE 1085. — Four centuries of exemption from all taxation is a valuable privilege for one family to enjoy. The British paterfamilas who grumbles and pays will hardly credit the existence of a heritage so peculiar, and will certainly not be surprised to learn that this happy family did not exist on English soil. The village of Chalo St. Mard is an obscure place in the vicinity of Etampes, which at a remote period was blest with a fortunate or enterprising *maire.* A legend, for which there appears to be no historic evidence, states that in the year 1085, Eudes, the mayor of Chalo St. Mard, made a pilgrimage to the Holy Land as a sort of proxy for the king, who was too ill to leave home, and in return for the troubles and dangers thus encountered he and his descendants and their families were to be absolved from the payment of taxes. What is certain is that in 1336, the descendants of Eudes renewed their claim, and it was allowed by the Chancellerie of Philippe VI. The document, said to have been signed by Philippe I, and forming the original grant of this singular immunity, was not then forthcoming, but an abstract or account of it was produced and certified as a correct copy or diploma by the Abbots of St. Magloire, St. Victor and St. Geneviève, who were contemporaries of St. Louis, King of France. This passed muster in an uncritical age, and the descendants of Eudes, Mayor of Chalo St. Mard, married and multiplied until they formed an untaxed tribe some thirty thousand strong. The story has just been retold by a French antiquary, M. Noel Valois, who states that this curious historical humbug was decisively detected and exposed by Antoine Marie d'Hozier in the middle of the last century. But the *ancien régime* was drawing to its close when in 1752 the exemption ceased. For at least four centuries a baseless fiction influenced even the unsentimental tax-farmers of France, and during the same long lapse of years the overtaxed citizens had the opportunity of contrasting the extortions to which they were subjected with the immunity enjoyed by the children of the Mayor of Chalo St. Mard and all who had the honor of kinship and alliance with them.—*Exchange.*

TRADE SURVEYS

No pronounced improvement has as yet set in in trade or manufacturing circles, according to the usually-quoted commercial authorities. There is unusual activity in various side channels not reported. What the trunk lines are doing this week, what the clearing-house reports are for the past six days, what the totals are in various staple products at distributing centres for the week, may be interesting reading, but they do not represent the actual trade and commercial conditions. The stock and bond speculators are counting unhatched chickens, manufacturers are figuring out future business, railroad projectorsare counting on the employment of millions of dollars that will yield dividends in a year or two, land speculators are anticipating great sales to new comers at high prices, and agricultural, mining and lumber and other interests are looking forward to a season of increased activity that will bring them larger volumes of business and better margins. At no time in the history of the country has as large a stream of capital sought employment in reproductive channels as now. To-day's earnings disappear in to-morrow's loans. The country is living economically and is avoiding inflated values in every direction. Overproduction is also avoided and an intelligent control is exercised in every branch of business, productive and distributive. So far as national legislation has gone, there is nothing to cause the great producing interests any concern. It is now more generally and more clearly recognized than it was a few years ago that an abundant supply of money is the prime requisite of industrial, commercial and financial health, and the feeble efforts made by the old school of lawmakers to run the business of the country on a gold basis make no impression against the powerful public sentiment, backed by business interests, that demands an abundance of the best money that our circumstances allow us to have and use. No financial policy has yet been mapped out and no vigorous efforts will be made very long in advance of actual requirements. Business men, manufacturers, builders, all are deeply concerned in the establishment, at the earliest day possible, of a financial as well as of a sound fiscal system which will satisfy the country. The natural process of decay will soon force a new financial system upon us. The purely money-lending interests will seek to gain vantage grounds they could not occupy when the present system received its birth in the throes of civil war. There is now no war, there is no other pressure than a purely business one on us to devise and adopt a sound system. There is danger of making a mistake because the money-lenders are few, united, keen and far-seeing, the masses whose future material interests are to be affected in the choice of a system or basis are uninformed, unorganized and indifferent. A right system of finance will open up a grand future, a wrong system will precipitate a depression and panic as soon as the economic heresies adopted in the furtherance of selfish interests can work their way to the vitals. The gold idea would in time double the present enormous individual indebtedness of the people to money-lenders without conferring any corresponding advantage. That an attempt will be made to foist a grinding and oppressive financial system upon us cannot be doubted by the student of our history for fifty years past or even by the observer of current events at Washington. The proper basis of our future monetary system will soon become the absorbing one among the leading minds on both sides of the question. Every week confirms the often-repeated statement that the brakes are being tightened on the wheels of trade. In iron, consumption is away behind. In coal the per capita consumption is not as large as last year, although the anthracite output is two days ahead of last year. So far this year the distribution of bituminous coal is one week ahead of last year in Eastern markets. In Southern markets coal and coke are in urgent demand. In Western markets demand is slack, and upwards of seven thousand workers in the Connellsville region are idle. There is great activity in the construction of lake craft and docks and wharves are to be built all along the lakes from Buffalo to Duluth to multiply the facilities for rapid shipment. Much new bridgework is projected across the Western and Northwestern rivers and Pennsylvania iron-makers who keep informed in this direction estimate that bridgework will be quite plenty during the last half of the year. The car and locomotive builders are crowded. Rail-mill owners look for orders aggregating 200,000 tons to drop in on them within thirty days after the defeat of the pending tariff bill. Agents for elevator-work in the Northwest, for electrical plants, water and gas works, for mining, flooring and lumber mill machinery have returned home within a week or two with even larger orders than were secured last year. On the other hand, several Eastern and Western trunk lines will discharge all the help they can dispense with, but so far as can be learned this week there will be no serious curtailment of manufacturing activity. Cotton mills will run as usual. The output of textile goods in general will be larger during the last half of the year than the first half. More heavy machinery is now under contract than ever. The labor question has assumed a more satisfactory shape. The fever of organization is subsiding and a clearer perception of the inutility of strikes, except in extreme cases, is recognized. The educational scheme will not be satisfactory for several reasons, one being the unwillingness of members to listen to anything but what suits them. Arbitration is less in favor. More aggressive measures will be demanded later on and strikes will once again be the popular means of advancing labor's cause. This reaction is probable within two years. The scattering of skilled labor in progress also helps to decrease the striking tendency for the present, but should a depression overtake the country the present conservative methods of labor management would be thrown to the winds. Lower rates of compensation will be established in several industries, especially in the West, where the expansion of capacity will not keep pace with the record of two or three years past. Labor leaders see that with the more complete organization of employers to contend against, their wiser policy lies in conservative methods. The secret of the advantage recently secured by employers is due to the expansion of producing capacity beyond current wants. Any industry can idle fifteen to twenty per cent of its force and thus bring labor to terms. Capital's disadvantage for a year or two past was due to the fact that it was necessary to keep every wheel turning. The situation has been reversed. Manufacturing interests find it cheaper in the long run to be able to suspend ten per cent of their labor force, even though a portion of their machinery remain idle, than to run to full capacity at wages virtually dictated by labor. Only second in interest to labor probabilities at this time is the question of prices. That there will be a reaction no one doubts. Bottom prices were looked for this month. Manufacturers East and West write and say bottom has not yet been reached. The only visible effect produced is greater curtailment. Failures are not increasing. Neither is mortgage indebtedness. Lumber manufacturers will make and ship more lumber than last year. The country trade is absorbing more than its usual average and Southern mills are increasing their production faster than Northern. Prices are firm but dealers along the coast argue lower prices will result from the great increase in output. This is guess-work. No one can measure the probable demands. Every farmer is a better customer than a few years ago, and the increased demand for building material and staple household products in rural localities may be safely estimated at double the volume of three or four years ago. Statisticians overlook this source in estimating probabilities of trade. Reports from one hundred and seven railroads show an increase in earnings from seventy to seventy-two million dollars for the first quarter of the year over first quarter of last year. Reports from Maine and Delaware River-shipyards indicate a busy half year from July 1st to make up for severe losses of schooners and small craft along the coast and Gulf. Ship timber and ironwork for ships have been contracted for in Pennsylvania quite liberally within the past month.

S. J. PARKHILL & Co., Printers, Boston.

THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. XXIII. Copyright, 1888, by TICKNOR & COMPANY, Boston, Mass. No. 646.

MAY 12, 1888.

Entered at the Post-Office at Boston as second-class matter.

CONTENTS

MANY of our readers remember the competition for the Masonic Temple, at Richmond, Va., which was announced last winter, and which has had a rather novel result. The competition was a limited one, invitations having been sent to fifty-three architects. The first premium offered was not the execution of the building, but a sum of three thousand dollars, in return for complete working-drawings and specifications, general supervision, and a guaranty that a responsible contractor could be furnished to erect the building for one hundred thousand dollars; and the committee reserved the right to reject any or all designs. Nothing was said about the employment of an expert jury to make the award. It is not surprising that only fifteen out of the fifty-three invited architects responded to the invitation, and persons familiar with such competitions will be prepared to learn that none of the designs were found satisfactory. Instead, however, of shipping them back to their owners, and clearing the ground for a fresh transaction, the committee, with what appears to be an honorable sense of obligation to the competitors, selected four of the designs, submitted by Messrs. Jackson C. Gott, of Baltimore, Rose & Stone, of New York, McDonald Brothers, of Louisville, and the J. B. Legg Architectural Company, of St. Louis, placing them in the order named, and reported to the Masonic Temple Association that in its opinion Mr. Gott should be given the first opportunity of making his plans satisfactory, and of demonstrating that the building could be erected in accordance with them for the stipulated sum. If he failed to do so within a reasonable time, to the satisfaction of the committee, its recommendation was that Messrs. Rose & Stone should be allowed the same opportunity; and so on until a satisfactory design was obtained. If one of the four architects named succeeded in making his plan satisfactory, the other three were to receive at once the small sums offered as second, third and fourth prizes, on condition that their designs proved to be capable of being erected within the limit of cost given in the circular. Whether Mr. Gott will manage to make his design pleasing to the committee, or how he will go to work to do so, we are quite unable to say, but he has our best wishes for his success, and, objectionable as the terms of competition were, we are not displeased to see that the committee proposes to adhere rigidly to the limit of cost specified. If it were once understood that this was an essential condition, and that designs which obviously could not be built for the sum named would not be considered, competitions would be much more attractive to honest architects, who, at present, can rarely tell whether to attach most weight to the stipulation in the terms of competition that the cost shall not exceed a given amount, or to the requirement that the building shall contain accommodations which cannot possibly be provided for the sum mentioned, and whose experience tells them that if they faithfully try to keep the price down to the limit, by a simple design, they are very apt to see the prize carried off by some reckless artist, who ornaments his elevations without any regard to expense, and, when he has secured the commission, either strips off coolly all the decoration before he makes contracts, or drags the committee into expending two or three times the sum that it had proposed to the competing architects as its maximum.

A MEETING was held a few days ago in Philadelphia to take measures for raising money to erect in Fairmount Park a monument to commemorate the one hundredth anniversary of the adoption of the Constitution of the United States. The Governors of the thirteen original States were invited, and it was decided to call upon the national Government, and the public, as well as the Legislatures, of the States and Territories, to contribute money toward the object. It is much to be hoped that the effort will succeed. The American people have been rapidly acquiring a taste for monuments, and the erection of statues to Farragut, Lincoln, and a dozen other Northern heroes, in New York, Boston, Chicago or Philadelphia, with those of Lee, Jackson and other Confederate leaders in Richmond and Charleston, have been attended with all the sentiment and enthusiasm that need be desired; but, although no Massachusetts man thinks with anything but respect of the Lee monument in Richmond, and Virginians are quite ready to share in the Northern admiration for Grant's noble qualities, there is no great sympathy between the sections in their feeling about such memorials, and the commemoration of the period when South Carolina and Massachusetts, New York, Virginia, Pennsylvania, and the rest of the emancipated colonies, sacrificed their opinions and forgot their jealousies for the sake of establishing in mutual forbearance and consideration the basis upon which the greatest of civilized nations has been built, would afford a peculiarly fitting occasion for the revival of the old confidence and regard, which the trials and even the quarrels of a hundred years have not shown to have been misplaced. There is now at the North, and probably also at the South, a strong popular feeling of what we might call affectionate Americanism, which finds now and then a chance for demonstration upon the occasion of the visit of some Southern military organization to the North, or *vice versa.* If this feeling, the depth of which surprises nearly every one who has seen it expressed, could be directed toward the promotion of some object having a common interest of sentiment for all sections of the country, the speedy accomplishment of the object would be assured, while the movement itself, if properly directed, could hardly fail to be of much political, or rather, patriotic, benefit.

AN interesting case in which an architect was a party was recently tried before the Court of Queen's Bench in England and is very fully reported in the *Builder.* There were, in fact, two cases, one, no doubt the only real one, being a suit of Mr. Hugh McLachlan, an architect, against Miss Grant, to recover compensation for professional services, while the other was a cross-suit by Miss Grant against Mr. McLachlan for damages for delaying the erection of the building. The evidence showed that Miss Grant, who was the proprietor of a noted girls' school in Kensington, consulted Mr. McLachlan about the erection of a new building for her school. She told him that she wished to build a school for eight hundred girls to cost ten thousand dollars. The architect replied that this could not be done, but that she could either build a ten thousand dollar school to accommodate less than eight hundred girls, or arrange plans for a building to contain the full number, and build at first only such portion of it as could be constructed for the sum she wished to spend. The last suggestion pleased Miss Grant, and she made an appointment with Mr. McLachlan to visit her school the next Saturday afternoon and go with her to see some land near by. This appointment was kept, and Mr. McLachlan at that time told her that his charges for services would be those mentioned in the Schedule of the Royal Institute of British Architects. It was some months before Miss Grant succeeded in purchasing a piece of land to her mind, and she then instructed Mr. McLachlan to prepare sketch-plans. These were made and approved, and working-plans and

specifications prepared for the portion, about one-half, which Miss Grant proposed to build at once. Meanwhile, Mr. McLachlan had written to Miss Grant, pointing out that the cost of the building on the site which she had bought would be much more than on the lot which he had looked at with her, and which she had first tried to buy. When the bids were obtained, the lowest real offer amounted to twenty-four thousand dollars, although there was a much lower one, which Mr. McLachlan, in a letter to Miss Grant, challenged as spurious. The land had been bought on March 10th, the preliminary sketch was approved on March 18th, and tenders were received on the seventeenth of July. Miss Grant then rejected all the tenders, and said she would build the school-house herself, and sent to Mr. McLachlan for the working-drawings. After some correspondence, Miss Grant wrote that she was going away on the twenty-ninth of July and would write to Mr. McLachlan on her return. This she did, notifying him September 15th that she had come back, and asking him to dine at her house whenever the plans were ready, to which he replied that he was ready whenever she pleased. During this month Mr. McLachlan sent in to Miss Grant the surveyor's bill for taking out quantities and for lithographing them, amounting to six hundred dollars. She refused to pay, and said that she would meet the surveyor in a court of law. She did so and was compelled to pay the full amount; but meanwhile a discussion had been going on between her and the architect, the result of which was that she took the work out of his hands, and employed one of her assistants, Miss Harrison, in making plans, which she afterwards carried out at an expense of about forty thousand dollars. On being dismissed Mr. McLachlan asked for his pay, setting his charge at three per cent on the lowest *bona fide* tender for the portion of the building to be executed at once, and one and one-quarter per cent on the estimated cost of the remainder, the total amounting to one thousand and eighty-seven dollars. Miss Grant, in reply, wrote Mr. McLachlan that her estimate of the work for which he had prepared plans was twelve thousand dollars and that she was ready to pay commission on this sum, which Mr. McLachlan declined; and, on his bringing suit, entered a cross-claim for four thousand dollars' damages for loss of interest on the price paid for the land while work was delayed by the architect, and for loss of fees of pupils who were prevented from coming to the school by the delay in providing the buildings.

AT the trial Mr. McLachlan testified that although Miss Grant had specified ten thousand dollars as the amount to be expended, this sum had been gradually exceeded with her consent, and that she had herself called for more costly construction and material in the way of fireproof flooring and terra-cotta fronts, besides increased accommodation. Miss Grant, on the contrary, testified that she had limited the proposed expenditure to ten thousand dollars; that Mr. McLachlan had not prepared the working-drawings for which he claimed compensation, as the detail-drawings were not completed; that it was "iniquitous" that architects should charge five per cent commission; and that the delay in preparation of the plans had caused her losses which she would prove by figures made by her assistant. This lady, Miss Harrison, being called to the stand, testified that the scholars' fees amounted to a certain sum per year and that this sum, multiplied by the number of scholars who would have entered or remained in the school if the new building had been ready sooner, made up the total damage claimed on that point. The architect's counsel here objected that it was necessary to prove that the scholars in question had been removed or detained from the school on account of the delay in completion of the new building, and one witness for Miss Grant was called on that item, who, however, admitted that the young lady about whom he testified was already nineteen years old at the time she left the school. The judge then instructed the jury that there was no question as to the employment of Mr. McLachlan, and that it only remained for them to decide as to the amount to be paid him. By the schedule of the Royal Institute of British Architects, two and one-half per cent were to be paid on the preparation of working-drawings and specifications, with an additional one-half of one per cent on obtaining tenders. As to the one and one-quarter per cent charged for the sketch-plans of the deferred buildings, he did not find any mention of this in the schedule, and supposed it to have been put in as one of the extra charges referred to in the pleading. As to the counter-claim, he had looked over the whole of the correspondence and did not see any complaint from beginning to end about damages arising from delay in completing the plans, nor did he find any evidence that Mr. McLachlan had been warned that he was incurring a penalty of something like five hundred dollars a month for such delay. It was, in his opinion, monstrous that such a counter-claim should have been made. After a few minutes' deliberation, the jury brought in a verdict for Mr. McLachlan of two and one-half per cent on the twenty-four thousand dollar tender for the portion of the building to be first erected, and fifty-two dollars for extra work in making sketch-plans for the complete design, at a scale of one-sixteenth of an inch to the foot, making a total of six hundred and fifty-seven dollars, and they found nothing for Miss Grant on the counter-claim. In explanation of the action of the jury in reducing Mr. McLachlan's bill, it seems probable that it may have considered the absence of some of the detail-drawings to be a fair offset against the one-half per cent charged for obtaining tenders, while the compensation for the sketch-plans, not being specified in the schedule, was probably estimated by the jury-men by the well-known standard of what they would themselves charge for making a few lines on a bit of paper.

THE Architects' and Engineers' Registration bill, recently offered in Parliament, came to an ignominious end on the seventeenth of last month. The bill was taken up on that day for consideration, Colonel Duncan moving the second reading. On this motion a short discussion took place, the engineers in the House of Commons, together with Mr. Isaacs, the only architect, we believe, in that body, and the Attorney General, opposing it earnestly, while not a single voice was raised in favor of it. The Attorney General, in particular, made an excellent point in saying that, in view of the great advance which had been made within thirty or forty years by the members of the three professions concerned, it would be difficult to show in what way the present system had failed; and in his opinion the House ought not to pass such a measure without being informed of the evils which it was intended to remedy. Sir Lyon Playfair added his authority against the passage of the bill, which, as he said, although modelled exactly according to the Act for the regulation of the practice of medicine which he had himself passed through the House, was not founded upon the same conditions, and was viewed with so much opposition by the professions interested that the House could not in justice enact it into law. This closed the debate, and, amid cries of "Withdraw," Colonel Duncan asked leave to withdraw his motion, and the matter was thus disposed of.

THE *Builder* reviews a book by Mr. Arthur Marshall, on "*Antique Carved Furniture and Woodwork*," the most interesting portion of which would seem to be the exposition of the frauds which are continually practised upon the unsophisticated buyer of such merchandise. In fact, the imitation of antique furniture has become a well-recognized business in many places, much to the detriment of artistic work, to say nothing of the morals of the dealers, and the tempers of the deluded buyers. It is well known that certain carvers make a study of the styles of the last two centuries, and reproduce with great success the sweeping, effective strokes of the ancient work; but this pardonable copying is often supplemented by a treatment with clay, which is spread over the carved furniture while wet, and, after drying, brushed off, so as to round the sharp edges of the tool-marks, and give the soft, worn air of antiquity. For imitating the wasted, ridgy look of oak furniture of great age, a wire brush is used, which rubs away the softer portions, leaving the hardest fibres prominent; and rusty nail-heads are often inserted in conspicuous places, on top of the modern screw which really holds the work together. For deluding still further the amateur with more money than experience, it is common to place the forged articles on sale in the rustic cottages of the districts most frequented by tourists. The occupants of the cottage are taught some romantic tale about the history of the pretended piece of antiquity, and a constant stream of Cromwell chairs and Dorothy Vernon writing-desks, many of them furnished with appropriate dates and autographs, passes in this way directly from the London manufactories to the drawing-rooms of susceptible amateurs, who can be relied upon to advertise the business of the enterprising dealer with enthusiasm so long as their delusion lasts, and to say nothing about the fraud practised upon them after it has been discovered.

SOME AMERICAN MONUMENTS.[1] — II.

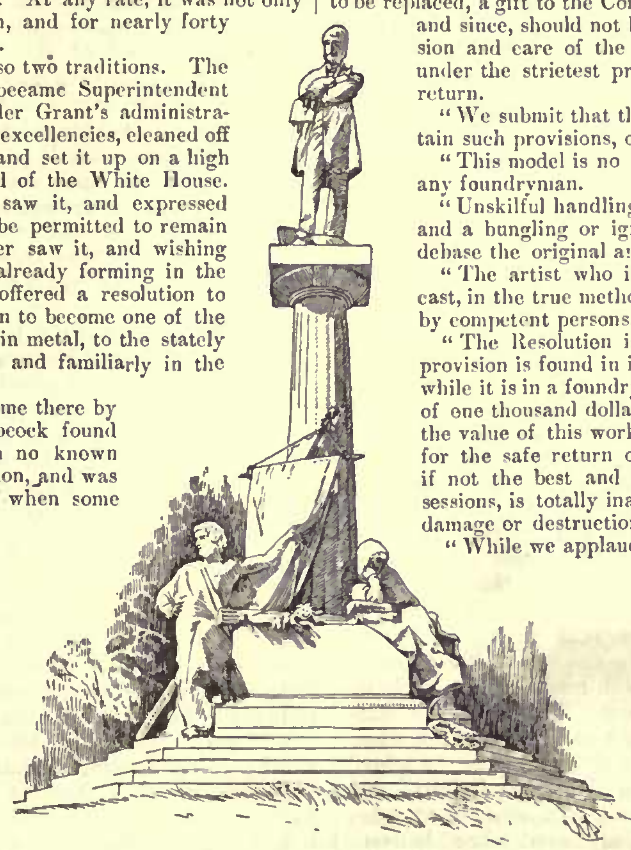
Monument to Gambetta at Cahors, France. Falguière, Sculptor.

THE BRONZE STATUE OF JEFFERSON IN THE CAPITAL AT WASHINGTON.

In 1834 Lieutenant Uriah P. Levy, of the United States Navy, brought to Washington a bronze statue,[2] larger than life, of Thomas Jefferson, made by an eminent French sculptor, David d'Angers. He offered it to the people of the United States, through Congress, but that body being largely Whig, refused to accept the statue, although strongly recommended to do so, by Jackson, at that time President. One tradition says, that the President ordered it to be erected in front of the White House. Another, that the statue was placed in front of the White House, in a clump of bushes, by the gardener, to hide it from public view. At any rate, it was not only soon hidden but effectually forgotten, and for nearly forty years remained in peace in that place.

Concerning its finding there are also two traditions. The first is, that when General Babcock became Superintendent of Public Buildings and Grounds, under Grant's administration, he found the statue, admired its excellencies, cleaned off its accumulations of dust and rust, and set it up on a high pedestal in plain air at the east end of the White House. Here, Mr. Hoar, of Massachusetts, saw it, and expressed surprise that so good a work should be permitted to remain out-of-doors. Here, also, Mr. Sumner saw it, and wishing to increase the company of images already forming in the Hall of Sculpture at the Capitol, offered a resolution to Congress, praying it to invite Jefferson to become one of the number. He was therefore brought, in metal, to the stately precincts that had known him often and familiarly in the flesh.

The other tradition tells how he came there by other means. It says, that Mr. Babcock found the statue a mass of verdigris, with no known claim to human respect or appreciation, and was about starting it for the junk-shop, when some chemically-inclined cynic, little aware of the worth of the suggestion, recognizing it as having a value as fine-metal, proposed that as copper was rated low in the market, the statue would not bring a price due its age and distinguished origin, and that it would give a new and unexpected interest to the development of sculpture in Washington, if it were cleaned, placed among its comrades in the Capitol and wait for a rise. The suggestion appeared feasible, and it was adopted. A generous bath of soap and water was given the assiduous author of the Declaration of Independence, and lo! a beautiful piece of bronze appeared to astonish and charm the metallic speculator. Such an example of statuesque reform was sufficient glory for any single administration. Important political changes succeeded this rejuvenating process, and the brilliant spirit of Monticello was lost in the maze of his rapidly increasing marbleized contemporaries.



Monument to Guiseppe Mazzini, Genoa, Italy. Pietro Costa, Sculptor.

For some years it remained as lost to sight as though it had remained in its original rustic enclosure, but from time to time an appreciative tourist saw its superior qualities and spoke of them with the enthusiasm that comes with the discovery of a diamond in a pile of rubbish. The city of Washington, tired out with a burden of complaint of its wretched imitations of sculpture, caught eagerly at the first breath of praise, and now the happy inhabitant, the joyful journalist and the hurrying "member from the rooral deestricts," talk of nothing else but "the best statue in Washington."

In his gift of the statue the patriotic lieutenant not only desired to pay tribute to the Father of Democracy, but he wished to crown Jackson's administration with an act peculiarly fitting, wise and tasteful. On its base it bears the following inscription: "Presented by Uriah Phillips Levy, of the United States Navy, to his fellow-citizens, 1833."

Lieutenant Levy and Lafayette were in Paris together at the time the statue was made, and when it was completed the latter threw his arms around it, and with much emotion, exclaimed, "My beloved Jefferson!"

The original plaster-model was given to the city of New York, by Lieutenant Levy, in 1834, and is in the Governor's Room in the City-Hall. There it remained in worthy tranquility until January, 1886, when the enterprising speculator in bronzes made an attempt to desecrate it, as the following paper will show:

"To the honorable Board of Aldermen. The undersigned respectfully represent to your honorable body: That they are nephews and eldest male relatives of Commodore U. P. Levy, deceased, and are tax-payers and residents of the city of New York. That they have learned that, by a resolution of the Board of Aldermen at a session held on the 4th instant, permission has been granted to 'Patrick Keenan, and such persons as he may associate with him, to make a bronze copy of the plaster-statue of Thomas Jefferson, now in the Governor's Room in the City-Hall.'

"We respectfully remind your Honorable Body that this plaster model of Thomas Jefferson, is the *original work* of the celebrated David who was the first sculptor of Paris, and one of the first in Europe, executed under the eye of Commodore Levy who was then a lieutenant in the United States Navy, aided by the valuable suggestions of the beloved Lafayette, and that it was presented by Lieutenant Levy to the city in 1834, more than half a century ago. That he also had a bronze copy perfected in Paris from this model, and presented it to the people of the United States through the two Houses of Congress; The model is more valuable than any reproduction of it in metal can be. It is the Master's own work. An original work of so great value and merit, so precious and impossible to be replaced, a gift to the Corporation, highly esteemed at the time and since, should not be suffered to pass out of the possession and care of the City for any purpose whatever unless under the strictest provisions for its use, preservation, and return.

"We submit that the Resolution in question does not contain such provisions, or any adequate provision.

"This model is no common plaster to be run in metal by any foundryman.

"Unskilful handling is certain to cause irreparable injury, and a bungling or ignoble reproduction would measurably debase the original and bring mortification to the assentors.

"The artist who is to direct and the founder who is to cast, in the true method, should be ascertained and approved by competent persons.

"The Resolution is silent as to these particulars. No provision is found in it for the care or safety of the model while it is in a foundry in the city of New York, and the sum of one thousand dollars, an insignificant sum compared with the value of this work fixed by the Resolution as a penalty for the safe return of one of the best and most valuable if not the best and most valuable of the City's art possessions, is totally inadequate as a security against its loss, damage or destruction.

"While we applaud the public spirit which impels a citizen, or an association of citizens, to undertake the cost of reproduction, we think that all reasonable men will recognize the force of the objections to the Resolution, and we therefore pray: —

"That your Honorable Body will reconsider and rescind the Resolution above referred to, passed January 4th, 1886.

"Respectfully submitted, Asahel S. Levy, Jefferson M. Levy."

David made several sketches of the statue of Jefferson, which are in the possession of his family. A terra-cotta reduction of the head is in the museum of Saumur.

He also made a bronze medallion of Lieutenant Levy, which he gave to the museum at Angers.

David wrote a great deal on art matters of every kind, and criticised freely every work of art and artist that he saw or knew anything about. Very few things passed him, and he ran the whole gamut of the centuries, from the Moses of Michael Angelo, to Rude's bas-relief on the Arch of Triumph, and Barye's Lion and Serpent. Of his own worth he never tired in rapturous appreciation. He had "moments" when his thoughts carried him to the contemplation of art especially, and generally they led him near home.

[1] Continued from No. 644, page 201.

[2] See *American Architect* for July 16, 1881.

At least, on one of these æsthetic voyages, "my thoughts take me to my studio, and I contemplate the majestic shadows of the great men to whose immortality I gave my life, my heart as an artist." He then passes in review the subjects of his chisel, until he comes to Jefferson, when he says: "This is Jefferson! who composed the Declaration of Independence. It seems like a chapter from the Bible!"

Although David has much to say about Lafayette and the bust of Washington, he never mentions the name of Jefferson, except in the apostrophe above quoted, and forgets the unusual, individual generosity and patriotism of Levy. This is all the more strange, for two reasons; first, because he paid great attention to the details of his experience; and second, because the Jefferson, as before stated, was made under the constant personal care both of Lafayette and Levy. Besides, it was a very rare occurrence in David's experience as a sculptor to receive so important a commission, as a large statue, from one person, and especially from a citizen of the Great Republic, in the founding of which, his friend Lafayette took a worthy part, and the Father of which was the great Washington, for whom he had such deep veneration. For the head of the statue the sculptor used a portrait in the possession of Lafayette.

Gossip has also been busy in regard to how the Jefferson came to be made, but the writer has found no evidence confirming the truthfulness of the stories set on foot by this assiduous dame.

In the "*Life of David*," it is stated, wrongly enough, that the Jefferson was paid for by a National subscription. After describing the statue, the author, M. Jouin, remarks, "The future President seems to be ready to march, as though he was carrying through the new world the words of liberty."

While Fennimore Cooper was American Consul in Paris, David executed a marble bust of the novelist, in 1827.

In 1828, Lafayette ordered of him a large bust of Washington, which was afterwards burned, somewhere in America. On receiving the money for the work from Lafayette, David returned it, with the remark that, while he was not rich enough to work for nothing, he yet could afford himself the pleasure of producing such a head without pecuniary return.

He executed a bronze medallion of J. Augustine Washington, a descendant of the first President, while he was a student in Paris, because he wished to honor the latter as a descendant of the former.

When he sent his large bust of Lafayette, in 1828, to America, he wrote a long letter to the President of the United States, and in it expressed the wish that the bust might be placed in the Capitol at Washington beside the monument of Washington, which he supposed was already erected there.

In his bas-relief, on the benefits of printing, which is part of the monument to Guttenburg, he modelled the heads of Benj. Rust,

Light-house on the Isle of May.

Lewis, Morris, Henry Laurens, Washington, Franklin, Jefferson, Hancock, John Adams, Lafayette, and Bolivar.

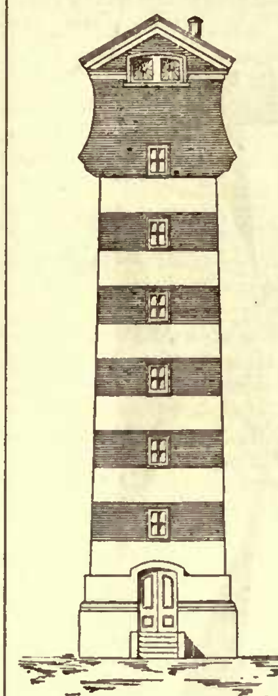
It is also related in the "*Life of David*," that one of his marble workmen named Beglar, had been in America, and often seen Washington. And this little anecdote is told by him of the Great Virginian, as an illustration of the practical perservance of his nature: "One day as Washington was in the field overlooking his negroes, he saw one who had one hand bandaged so that he could not use it, and so did not work. Whereupon Washington put one of his hands in his pocket, took a hoe in the other and gave the negro a lesson in working with one hand."

David was a sculptor of great talent, but he injured his reputation by trying to do too much work. He is better appreciated by critical artists for his superb medallions, which he made by the hundred, than for his statues. Many of the latter are considered dry and stiff in execution. He was singularly lacking in the understanding and appreciation of great art. His pupils were many, and one of them, Jean Louis Brian, left one uncompleted statue, in clay, at his death, that for high sculpture is regarded as one of the very few masterpieces of French art worthy to be mentioned in connection with the Greek. And yet its author has no popular history whatever, and his name and work are only mentioned by the small number of carefully observing artists. This little statue is in bronze, at the expense of the State, and has its place in the corridor of the School of Fine Arts. It was in the Salon of 1864, and received the Medal of Honor. Brian's humble life, and his priceless contribution to his country's art, is one of the many instances in the history of art in Paris, that goes to prove that much that is not popularly known in art is of vastly more consequence than that which is too much known.

T. H. Bartlett.

[To be continued.]

ANCIENT AND MODERN LIGHT-HOUSES.[1]—XXI.



Light-house at St. Pierre de Royan, France.

The light-house situated on the Isle of May, Scotland, at the mouth of the Firth of Forth, was originally lighted in 1636 by an open coal-fire; it was altered in 1816 to argand lamps, with silvered parabolic reflectors; in 1836 it was converted to the dioptric system, and on the 1st December, 1886, the electric-light was substituted: as this light is now the most powerful in the world, a general description may be of interest in this connection.

The Board of Trade suggested its introduction at the Isle of May, on the ground that "there was no more important station on the Scottish shores, whether considered as a land-fall, as a light for the guidance of the extensive and important trade of the neighboring coast, or as a light to lead into the refuge harbor of the Forth."

Notwithstanding its isolated position and the difficulty of access, it was decided to accept the view of the Board of Trade. The necessary plans were prepared by the Messrs. Stevenson, and the works commenced in June, 1885, were completed and the light established by the first of December, 1886. The existing establishment consisted of a light-house tower, with accommodation for three keepers — it was necessary to provide dwellings for three more keepers with their families, and buildings for the steam and electric plant, coal-houses, etc. All these were placed near the base of the island, in order to be near the small fresh-water loch, and to save the cost of transporting the coal and of pumping the water to the top of the island, while the saving of the cost of carriage of the materials and machinery to the top of the island, and of piping and pumping machinery would more than counterbalance the original cost of the conductors.

It was originally intended to use the Brush compound wound Victoria dynamo, giving a continuous current and supplying a single automatically-fed arc-lamp of 30,000 candle-power. The Brush Company at once set to work to make such a lamp, but after numerous trials they were unable to do so, consequently recourse was had to the more expensive alternate current magneto-electric machines of De Meritens, which, though not so powerful, had given excellent results in several light-houses and at the experiments at South Foreland; they were of the L type and of the largest size hitherto constructed, weighing four-and-one-half tons each.

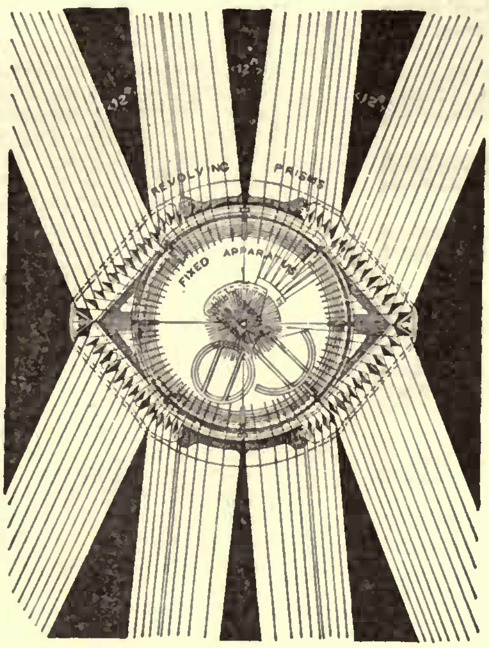
They are so arranged that one-fifth, two-fifths, three-fifths, four-fifths or the whole of the current of a machine can, at pleasure, be sent to the distributor for transmission to the lantern, the two machines can also be coupled and the full current from both be employed. The engines and boilers are in duplicate.

The conductors are copper-rods one inch in diameter, well insulated, the length is 880 feet, the loss of the total energy is twenty per cent.

[1] Continued from page 195, No. 644.

The lamps are of the Serrin-Berjot type, and the carbons are of Siemens make, and have a soft central core of pure graphite which improves their steadiness in burning; they are 1.6 inches in diameter, but two-inch carbons can be used when both machines are running. With one machine the power of the arc is estimated at 12,000 to 16,000 candles.

The dioptric apparatus (see figure showing horizontal section through focal plane) is of a novel description, the condensing principle being carried farther than in any other apparatus previously constructed. Certain sectors are darkened by diverting the light from them, and the light is thrown into adjoining sectors so as to re-inforce their light. Thus the power of the light is increased in proportion as the dark arc is increased. The light gives four flashes in



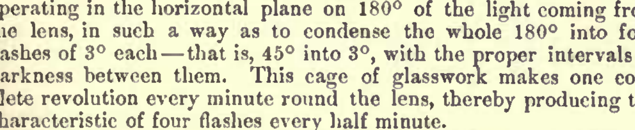
HORIZONTAL SECTION THROUGH FOCAL PLANE.

quick succession every half minute; and during the bright periods the effect of this concentration of the rays is that the light radiating naturally from the focus is increased in power fifteen times in azimuth in addition to the vertical condensation, excepting, of course, the loss due to reflection and absorption.

The apparatus consists of a second-order fixed lens fifty-five inches in diameter, which operates on the rays so as to make them issue from the lens in horizontal planes.

Outside this lens there is a revolving cage of straight vertical prisms, extending the full height of the lens, or five-one-half feet, and composed of two panels on opposite sides of the centre, each operating in the horizontal plane on 180° of the light coming from the lens, in such a way as to condense the whole 180° into four flashes of 3° each — that is, 45° into 3°, with the proper intervals of darkness between them. This cage of glasswork makes one complete revolution every minute round the lens, thereby producing the characteristic of four flashes every half minute.

The resulting beam of light from this apparatus is about 3,000,000 candles when one magneto-electric machine is in use, and with both machines about 6,000,000 candles. The light has been picked-up



and recognized by sailors at forty and fifty miles off, by the flashes illuminating the clouds overhead, though the geographical range, *i. e.*, the distance which the curvature of the earth would permit the light to be seen, is only twenty-two miles.

Surprise has frequently been expressed by masters of vessels and by residents on the neighboring shores who live in view of the Isle of May light, that this light, which is so exceedingly brilliant in clear weather as to cast shadows at a distance of ten or fifteen miles, is so cut down by the fog that some go the length of believing the old oil-light (9446 candles) was better in a fog. All who have had experience with the electric-light are quite prepared for the first part of this statement, while the last, it need hardly be said, is a mistake, inasmuch as the electric-light has been proved, by experiments in both natural and artificial fog and also by observation on existing light-houses lighted by electricity, to be in all circumstances of weather the most penetrating.

Every night at 12 o'clock the lightkeepers at St. Abb's Head, twenty-two miles distant, where there is a first-order flashing light, and one of the most powerful oil-lights in the English service, observe the Isle of May light, while the keepers at the latter also observe the St. Abb's Head light. The result of five months' observation is that the Isle of May light is seen one-third oftener from St. Abb's Head than the St. Abb's Head light is seen from the Isle of May. It is perfectly true, however, that the superiority which is so apparent in clear and in rainy weather is very much reduced in hazy weather, and practically disappears in very dense fog. Looking to this fact and to the large first cost and annual maintenance, there is no doubt, that the conclusion arrived at by the Trinity House[1] is sound, that electricity should be used only for important landfall lights.

PARIS CHURCHES.[2] — VIII.

SAINTE GENEVIEVE. — (THE PANTHÉON.)

THE foundation of the abbey of Ste. Geneviève dates back to the time of Clovis. After having dispersed the Visigoths upon the plains of Vouillé, he desired to celebrate his victory by the erection of a church upon the hill which overlooked his Palais des Thermes upon the left bank of the Seine. This he dedicated to the memory of S.S. Peter and Paul and placed under the keeping of a congregation of religions. Clovis was buried there, and after his death his widow Clotilde finished the buildings. The child of Clodonier, whose eyes were put out, were also buried there, and at Clotilde's death she, too, was laid in a tomb near that of Ste. Geneviève.

Geneviève was a peasant girl of Nanterre, a little hamlet situated upon the plain over which Mont Valérien now frowns. She was born in 421 and was employed as a child in tending sheep. When about seven years of age, St. Germain, bishop of Auxerre, seeing her amongst a crowd of people who had surrounded him to receive his benediction, became aware of her predestined glory, and finding that she desired to be a handmaiden of Christ, he hung round her neck a small coin marked with the symbol of the cross and thus consecrated her to God's service. Many miracles are recorded as due to her prayers even while yet a child. But, although she was practically good and reverenced her parents, she was much persecuted by demons and men. Her arch enemy, the devil, seems to have particularly objected to her love of praying during the night, for he

[1] The Trinity House of England and the Scotch Board of Northern Lights instituted an exhaustive series of experiments at South Foreland, England, in 1884–85 to determine the relative values of oil, gas and electricity as light-house illuminants; the following is a summary of their report so far as oil and electricity are concerned:

"The electric-light, as exhibited in the A experimental tower at South Foreland, has proved to be the most powerful light under all conditions of weather, and to have the greatest penetrative power in fog.

"For the ordinary necessities of light-house illumination mineral-oil is the most suitable and economical illuminant; for salient headlands, important landfalls and places where a very powerful light is required, electricity offers the greatest advantages."

A single oil-burner, placed on the focus of a proportionately sized lens, is sufficient for the generality of cases.

This is specially the case since the introduction, on Messrs. Stevenson's suggestion, of hyper-radiant apparatus suited for use with burners of large diameter. An experimental lens of 52⅜ inches focal distance was constructed by Messrs. Barbier & Fenestre, and was fully experimented upon at the South Foreland. It proved entirely satisfactory, and since then the Light-House Board of the United States has ordered and received one of these lenses which is now in store at the United States General Light-House Depot, Tompkinsville, Staten Island, New York.

This lens is composed entirely of brass and cut-glass, and when the sun shines on it, it sparkles with all the colors of the prism, reminding one of an immense soap-bubble. Its cost was nearly $16,000.

[2] Continued from page 33, No. 630.

continually blew out her candle during her vigils in spite of her power of rekindling it through faith and prayer. This is a favorite subject of mediæval sculptors, and I remember seeing one statue of the Saint with a demon on her back holding a pair of bellows with which he is blowing out the candle in her hand. Ste. Geneviève was an early Jeanne d'Arc, and through prayer alone caused the Huns who were besieging Paris under Attila to flee. On another occasion, when the city was invested by Childeric, she took the command of some boats which were sent up the river to Troyes for succor and brought them back laden with provisions. When the city was taken Geneviève was treated with great respect by Childeric, and it was through her influence that Clovis and his wife, Clotilde, were converted to Christianity and the first Christian church was erected in Paris.

This legend of feeding the besieged Parisians is said to be the origin of the *pain bénit* of the Paris churches, a custom peculiar to the old Parisian rite and almost the only one kept up since that rite was superseded by the Roman, some few years since. This blessed bread is a large *brioche* offered by some parishioner and brought into church in procession during the offertory. It is usually piled up on a stage and decorated with flowers and lights, the whole being carried on the shoulders of acolytes. Preceded by the beadle and donor, it is taken to the altar and sprinkled with holy water; some prayers are said, the donor is presented with a pat and a kiss, and the procession then returns to the sacristry, where the cake is cut up and carried by acolytes round the church in baskets for distribution. One often sees strangers refuse it, thinking it something peculiarly Popish or sacred, but they might be sure, if it were so very holy, they would not get the chance of partaking of it. It is rather a sort of amicable meal, after the manner of the early Agapemone, but it is a pretty ceremony, and it is always refreshing to witness any little peculiarity in ritual, instead of the dull uniformity which recent Papal decrees have enforced all over Europe.

In the ninth century Ste. Geneviève became the patron of the abbey, and some of the capitals of the church of that period or a century later are now in the court of the École des Beaux-Arts. In the thirteenth century the church was rebuilt, but gradually falling into decay, it was condemned in the reign of Louis XV and demolished in 1801–07 to make way for the rue Clovis. When the crypt was destroyed a large quantity of stone coffins, medals, pottery, shields and lances of Gallo-Roman and Merovingian workmanship were found.

The reliquary of the saint was made in 1242 by a celebrated goldsmith named Bonnard. It contained one hundred and ninety-five marks of silver and seven and one-half marks of gold, and from time to time it was loaded with precious stones. Germain Pilon sculptured four female figures in wood to support it, which were the only parts saved at the Revolution; they are now in the Renaissance Museum of the Louvre. The *châsse* was melted up and the jewels sold, the whole producing only 21,000 livres. Some of the monuments of the church were saved, that of Cardinal de la Rochefoucault sculptured by Philippe Buister in 1645 being placed in the chapel of the hospital for incurable women of which he was the founder. The statue of Clovis (twelfth century) is now at St. Denis, owing to the accident of its having been replaced in the seventeenth century by a superior one in white marble, which was destroyed in 1793. The first statue, "*mangée et difforme d'antiquité*," according to Father Dubreuil, was relegated to the crypt, where it was found when the church was demolished. Another tomb, that of a chancellor of Nôtre Dame de Noyon who died in 1350, is now in the École des Beaux-Arts.

Some of the conventual buildings remain and form part of the Lycée Henri IV. The tower is Romanesque at the base and Pointed at the upper stories — fourteenth and fifteenth century respectively. The cloisters and refectory form part of the school buildings, but they have been much modernized. The refectory is an elegant building of the thirteenth century and now serves as the school chapel. In the sacristry is a large stone statue of the patroness (thirteenth century) which formerly formed part of the central pillar of the principal doorway; it represents her with a demon on one shoulder blowing out her candle and an angel on the other relighting it. What was formerly the library is a series of galleries upon the plan of a cross, with a cupola at the intersections. It is no longer used for this purpose, all the books having been placed in the new building on the other side of the square.

The modern church was built by Soufflot in 1764 at the instigation of Mme. de Pompadour; and since the Revolution it has been a constant bone of contention between the different political parties. At one time dedicated in gratitude "*aux Grands Hommes*," it has at another been under the patronage of Ste. Geneviève. Sometimes a mere show building, at others it has had its altars and its canons to serve at them, and has been the scene of enthusiastic processionings, and pilgrimages; at the present moment it enjoys secularity, which makes most of its internal decoration out of all harmony with its use as a mere burial-place for distinguished Frenchmen. Smaller than St. Paul's, London, it is more perfect in its Classicism. It is built on the plan of a Greek cross, with a dome over the intersection. Its decoration has been almost as hopeless as that of St. Paul's, and has fluctuated between the different schools, as much as the uses of the building have changed.

Commenced by Baron Gros and Gérard, in the false, pretentious style of the first Empire, the dome is as glaring a piece of bad taste as the apse of the Madeleine. For some years the decoration of the building was stopped, but within the last decade it has made another start with Puvis de Chavannes's "Life of Ste. Geneviève." The direct opposite of Cabanels's "Life of St. Louis," pictures which are hard and dry and crude, M. Puvis de Chavannes's are vague and foggy. His figures are clumsy, thick of ankle, neck and wrist, but otherwise attenuated to the last degree; and were it not that the far-off people are smaller than those near the spectator, no one would know that they are on different planes, for of aerial perspective, there is none. Yet there is a certain purity of sentiment which is meant to be Giottesque (without, however, the old master's color and clear outline), and a great charm about the landscape backgrounds; and a hen and chickens picking up some grain are excellently painted. The pictures by Maillot are equally wanting in aerial perspective, but not from fogginess — quite the contrary; *they* err on the side of equal brilliancy. They represent the citizens of Paris carrying the Saint's *châsse* to Nôtre Dame in the reign of Charles VIII. A crowd of people descend the "mountain" and cross a peculiar zigzag wooden bridge with no side-rails. The horizon is close to the top of the frame, so that the *châsse* appears to be falling off the shoulders of the men who carry it, and the people seem stepping down a steep incline. The color is bright and the costumes picturesque, and the whole has an early Flemish appearance; so early is the style that it looks as odd as a series of Van Eycks or Van der Weydens would in an eighteenth century building — utterly incongruous. Imagine Raphael or Michael Angelo decorating St. Peter's, Rome, in the manner of Giotto, Botticelli or Ghirlandajo. Totally different, but equally out of keeping with the building, are the pictures of J. P. Laurens, of incidents in the life of the Saint, or rather, miracles worked by her. Splendidly drawn are they, and full of dramatic power, as is all Laurens's work, but somewhat black, as is usual with this artist. Then we have some of M. Emile Levy's, who is never of much value except in portrait-painting, and in that only now and then. Here at the Panthéon, he is more than usually woolly and wanting in vigor. Directly opposed to them are M. Bonnat's masculine, though somewhat black, works. Last, but not least, charming in design, refined but not weak and quite in harmony with the style of the building are the mosaics of M. Hebert, which are amongst the best work that I have seen by him; for these are exempt from his faults of affectation. On the whole, the decoration of the Panthéon gives no encouragement to other nations who want great masses of wall in large buildings, covered with pictures. The art seems to be lost; for if the greatest of the French painters have, from one reason and another, failed, who is likely to succeed? No school is so dramatic as the French, even in these days of Naturalism and Impressionism and other cant-isms; and yet these wall-paintings fail to impress us in the same way as we are impressed, say, by the Benozzo Gozzoli frescos of the Riccardi Palace in Florence. I fear it is the spirit which is wanting, the religious sentiment. We can draw better and paint better and compose better — but the sentiment is lacking; thus our pictorial decorations of large buildings are failures, whether we turn to Paris or Munich, or Berlin or London — perhaps the worst are the dismal, cold, maudlin Nibelungen-lied manufactures at Munich. The French are Raphaelesque compared to those poor German efforts. S. Beale.

ILLUSTRATIONS

[*Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.*]

HOUSE OF C. F. ADAMS, ESQ., BOSTON, MASS. MESSRS. PEABODY & STEARNS, ARCHITECTS, BOSTON, MASS.

[Gelatine print, issued only with the Imperial Edition.]

A helio-chrome print of the doorway of this house was published in our issue for April 21.

TOWN-HALL AND LIBRARY, WINCHESTER, MASS. MESSRS. RAND & TAYLOR, ARCHITECTS, BOSTON, MASS.

COST of building complete $50,000. Material selected, water-struck hard brick and Longmeadow-stone trimmings. The interior construction is, generally, what is known as "mill construction" — hard pine beams and plank floors, ceilings plastered between the beams on the planking. Considerable "terra-cotta lumber" has been introduced for partitions and as brick wall linings. The interior finish is entirely of yellow pine. The seating capacity of the hall is thirteen hundred. The following are the contractors: — For foundation work, J. M. Ellis, Woburn; for mason work, Gooch & Pray, Boston; carpentry work, Ivory F. Tarbox, Malden; heating and ventilation, Gardner C. Hawkins, Boston.

COMPETITIVE DESIGN FOR THE ELLIOT CHURCH AT NEWTON, MASS. MESSRS. HARTWELL & RICHARDSON, ARCHITECTS, BOSTON, MASS.

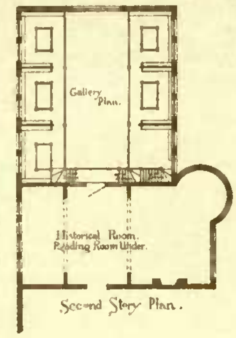
HOUSE OF H. E. BREWSTER, ESQ., UTICA, N. Y. MR. W. H. SYMONDS, ARCHITECT, UTICA, N. Y.

The house is built of red brick with brownstone finish.

HOUSE AT LITTLE HARBOR, N. H. MESSRS. LONGFELLOW, ALDEN & HARLOW, ARCHITECTS, BOSTON, MASS.

AMERICAN ARCHITECT AN

COPYRIGHT 18

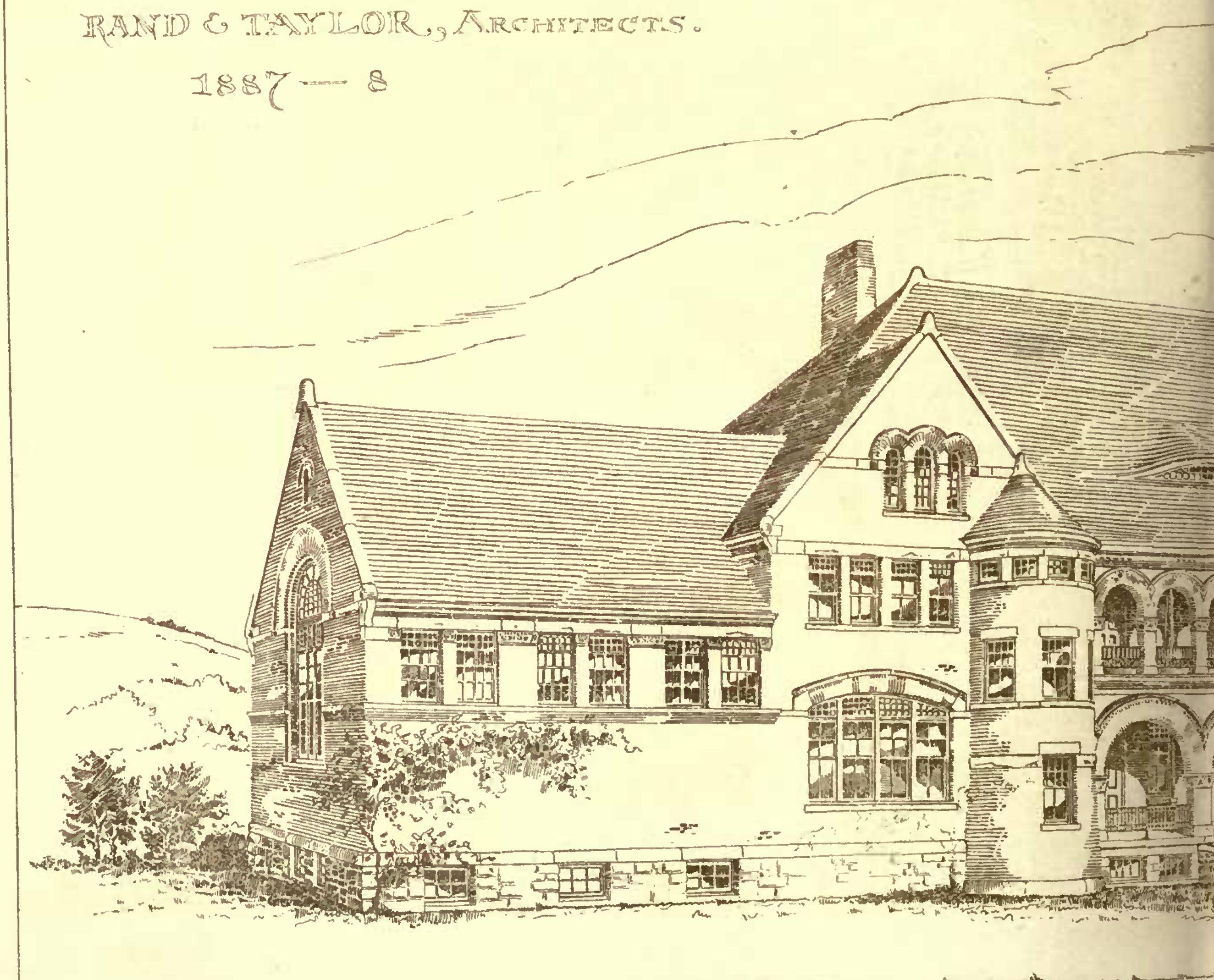


Interior View of Library

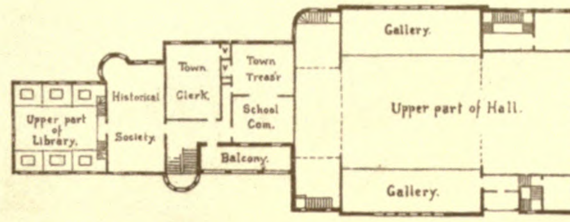
TOWN HALL & LIBRARY, WINCHESTER,

RAND & TAYLOR, ARCHITECTS.

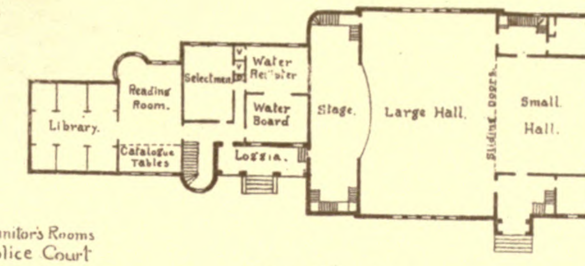
1887 — 8



...CENOR & CO

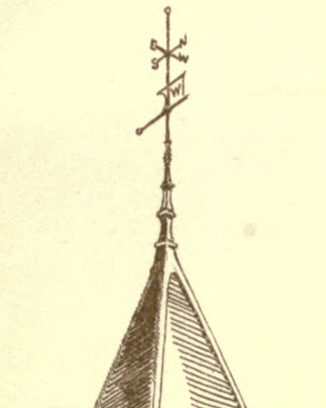
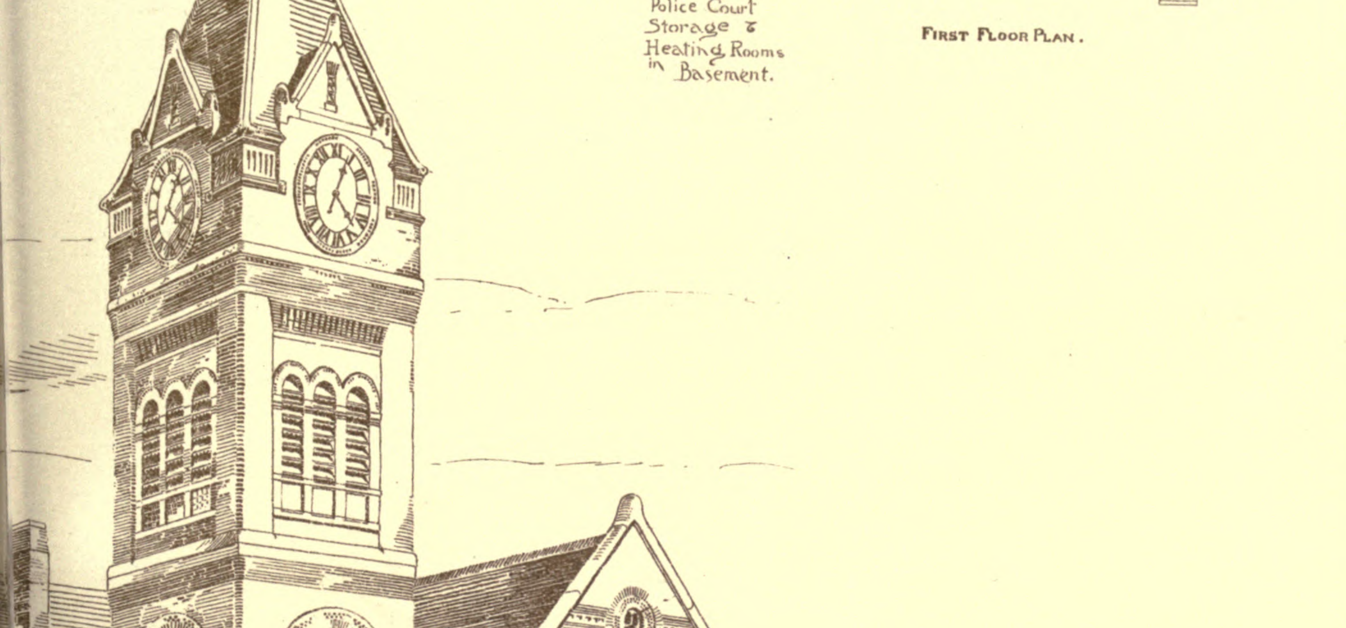


SECOND FLOOR PLAN.



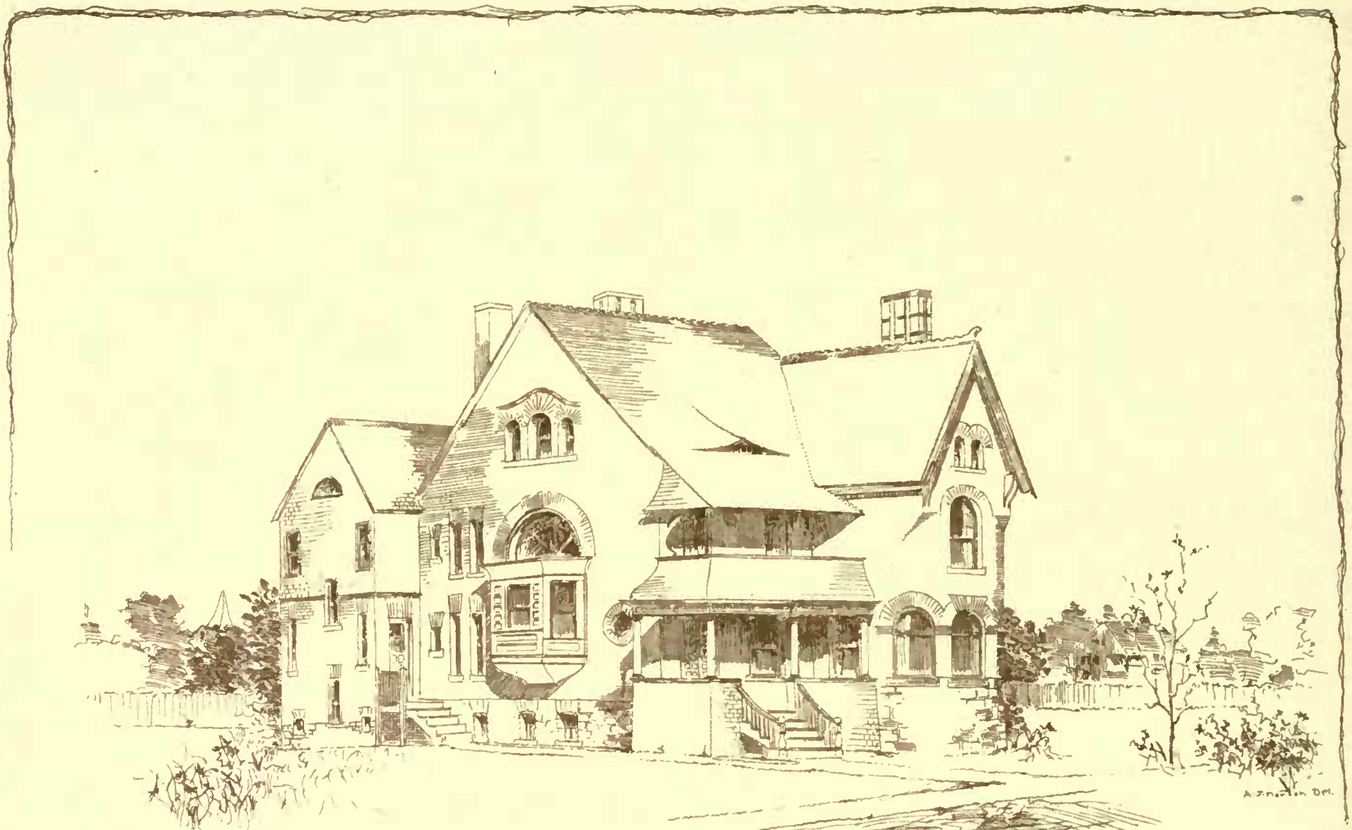
Janitor's Rooms
Police Court
Storage &
Heating Rooms
in Basement.

FIRST FLOOR PLAN.

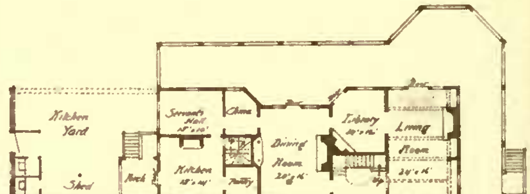
Heliotype Printing Co. Boston.

Copyright 1888 by Ticknor & Co.

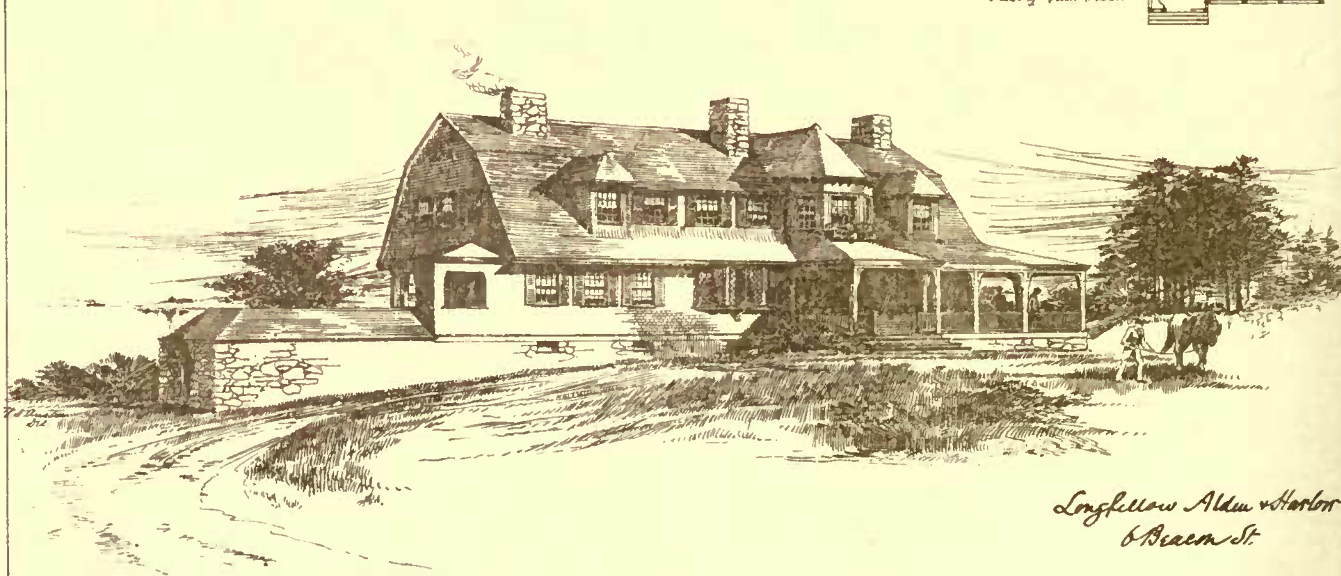


·House for Mr. H. E. Brewster · Utica N.Y.·
·W. H. Symonds · Archt·
·Utica · N.Y.·

House at Little Harbor
N·H·



Plan of First Floor.

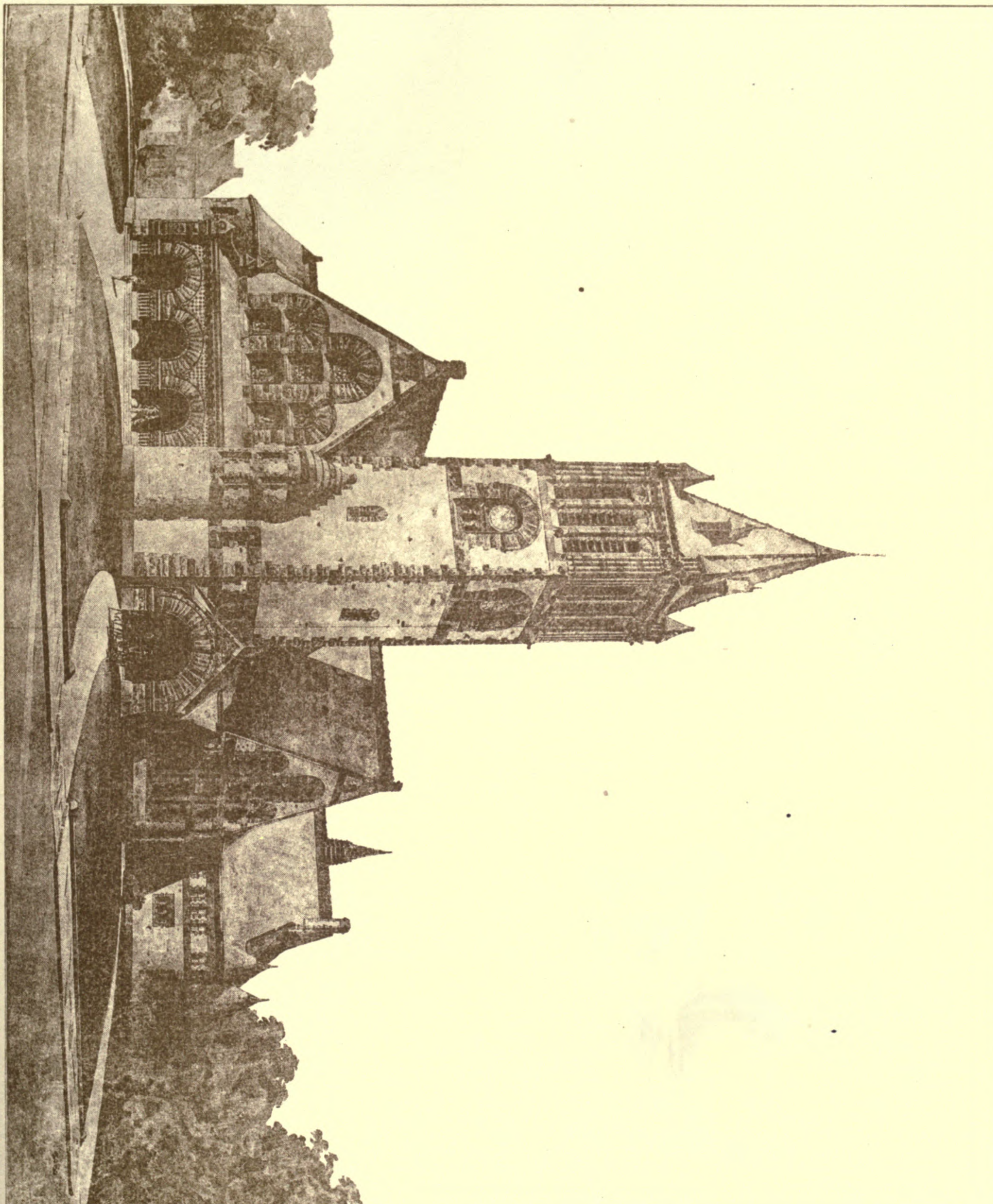


Heliotype Printing Co. Boston

COPYRIGHT 188

Heliotype Printing Co. Boston.

COPYRIGHT 1888 BY TICKNOR & CO



Design · for · ELLIOT · CHURCH · Newton · Mass ·

Heliotype Printing Co. Boston.

"TWIN OAKS," — HOUSE OF GARDNER G. HUBBARD, ESQ., NEAR WASHINGTON, D. C. MESSRS. ALLEN & KENWAY, ARCHITECTS, BOSTON, MASS.

NOTE: — Too late for publication we learned that the architects of the house of J. C. Abbott, Esq., published in our last issue, were Messrs. Hutchesson & Steele of Montreal.

VANDALISM IN MODERN ROME.

House at Dol, Brittany.

IN an extensive experience of cities in the old world and in the new, says the correspondent of the *Times* in Rome, I am not aware of having been brought into contact with anything on the whole worse in the way of municipal government than that of Rome at this present time. Whether it be the policing, the state of the roads, the sanitary regulations, the little ordinances which pertain to the comeliness of the city, or the common decencies of external deportment, the absolute contempt that is shown for the authority of the municipality is something which in England we see only in the pantomime. What the city authorities seem most to consider is what grandiose plans for the future they shall inaugurate; and, having permitted and encouraged speculations which have led to the most colossal private bankruptcy of the epoch, and plunged the city into debts that are beginning to make life here difficult for people of moderate means, they are planning for an extension of operations which shall compromise the financial future of the city. There seems to be no practical common sense in the anticipations of the authorities; they have seen the period succeeding the transfer of the capital to Rome followed by an enormous influx of population — employés and speculators, the followers and hangers-on of a Court and a Government; and the momentary, and for the moment exhaustive, demand for quarters consequent on the increase has started an immense building *furore* which has ruined Rome æsthetically, the speculators financially, and profoundly compromised the future of the city. For the speculators and their victims we will waste no tears; for the disfigurement of the finest city site the world can show regrets are useless; and if the Romans are indifferent to the results of the horrible taste which presides over the renovation of their city we have no business to do more than record a protest and, when things are too bad, stay away.

But a warning against the present tendencies may be of use to English capitalists, if one were needed after the experience of Florence. A friend who has recently had the curiosity to make the tour of the new and renovated quarters estimates that there is now built and unoccupied and in course of construction accommodation for 100,000 people, and this enormous addition has been prepared on the anticipation of an increase of the population on the ratio of the past few years. But when the Court, the Government in its various branches, the army headquarters, and the parasitical industries that spring up around a Court have been enrolled and completed, the influx must return to a normal rate, which, for a city which has only a population of 300,000, is a small affair compared with that of Rome during the years which provoked the past speculation. Rome has no manufactures nor facility for them, no trade and no port — it can only have the importance of the capital city of a nation whose industries are still in the future, and which, as far as their roots exist, seem to be alien to Rome.

The wisdom which has presided over the works in Rome has been characterized by the Roman journals in terms more severe than I care to use. The waste of money from want of general plan and common prevision is beyond belief, except by those who are eye-witnesses, and, in spite of all financial difficulties and an already visible check to the growth of the city, the colossal plans grow as if the city were destined to cover the Campagna as in the days of the Roman Empire. And, more or less, the extensions involve the destruction of what remains of what made Rome interesting to the visitor, of which so much has gone already, and which was the productive capital of the city. The magnificent Ludovisi gardens, the pride of the Rome of the Popes, was offered to the Roman municipality for 3,000,000 francs. They are now as building lots worth ten times that sum, and the city has no drive within the walls. There was in the old days a zone of garden and villa grounds extending nearly round the inhabited portion of the city, of which now but little remains, and this is mostly marked out for the expropriation, road-making, and barrack-building which has buried the rest. And the next step announced is one which touches the English public in a peculiar way, for it contemplates the practical destruction of the beautiful gardens of the English Embassy, the only really fine example remaining of the gardens of the old Papal days; for its superb ilex avenue, the finest in some ways that I know, must have been planted centuries ago. It is flanked by a portion of the Aurelian wall along which the taste and care of the ambassadors have provided a series of natural pictures, which, added to the shrubberies, make it the prettiest bit of nature within the walls. The last extension of the plan for the uglification of Rome provides for the practical abolition of this bit of old Rome, by the expropriation of the ground for a drive inside the walls from the Pretorian camp to the Villa Ludovisi building-lots, useless as a means of communication, for there are streets directly communicating, and superfluous as a drive, for there is one laid out 40 metres wide on the outside of the wall over the same space, and the only effect will be to leave the wall between two roads and compel the Embassy to change its quarters.

And the expense of this new freak in changing the plan will be counted in millions of francs, for the portion involved in the Embassy grounds alone will amount to about half a million, the land there being worth 150 francs the square metre. The Embassy has protested, but it is clear that, unless the Italian Government veto the project, the protest will not be attended to any more than if it were made by the King of Cocaigne. There is no excuse for the expropriation, for the Embassy lies at the very end of the proposed drive, which actually terminates with it and has no exit beyond. The secret of the expedient is probably to make the place untenable to the Embassy, and so throw the entire gardens on the market for the speculators to cut up and build on.

And all the attacks and exposures of the Roman and foreign press will no more reach the soulless municipality than the flutterings of the dirty linen out of the windows of the houses on the streets, in violation of the law. It has spent the loan of 130,000,000 francs, and has not done half the work it was calculated to cover, and which an economical adminstration would have made it cover; but it goes on in the same reckless way, and will go on until the Prefecture of the Tiber supersedes it, for the salvation of Rome from further ruin. Even the financial disasters of the past few months do not seem to check it, and a report that an English company is going to take up the completion of the suspended constructions is welcomed as a wind to keep up the drift of affairs. There is no doubt that, to a limited extent, capital might be employed in finishing a few of them as comfortable apartment houses, but the greater part of them are too flimsy to serve for anything but cheap lodgings. They are mushroom products of a mushroom administration.

TECHNICAL EDUCATION IN FRANCE.

From La Construction Moderne.

THE sums annually expended for public instruction in France give perhaps an approximate idea of the great sacrifices which are made by the nation for the intellectual advancement of the growing generation. The present general expense for public instruction in France is stated to me to be above 300,-000,000 francs. To this sum the Minister of Public Instruction and Fine Art contributes annually 130,000,000 francs, while the rest is contributed by municipal and township funds.

In this is not included what is contributed by the Ministers of Commerce and of War for special training-schools coming under their heading. An outline of the great expense and the immense growth of the school system of Paris I have given in another part of my report. I will here only repeat that the sum expended there for maintenance of municipal free schools is in the neighborhood of 30,000,000 francs, about five times the amount spent in the last year of the Empire.

The burdens borne for this great object of public education in the sense and manner in which it is carried through in France, will, however, in their natural sequence bring out results fully compensatory of the outlay. The system of education is eminently practical and outspoken in its aim; viz., to fill French industry with a trained set of workmen and to diffuse them into all branches of national activity, manufacture and agriculture. Those who suppose that France has ceased to be a formidable opponent in the peaceful contest of industry and commerce seem to judge from passing conditions and not to take into consideration the great evolution taking place

in all departments of mental activity, which in due time will prove to be of far greater moment in determining the future position of France than the sanguinary revolutions and wars which have taken place during the century.

An institution of great importance in the general school system of France is the General Council of Education of France (Conseil supérieur de l'instruction publique), composed of sixty-four members and having its seat in Paris. About three-fourths of the members of the council are elected by the inspectors and schools of the departments and the great educational institutions. The President of the Republic appoints the other members and the Minister of Education is president of the council. The departments take their representatives frequently from the ranks of leading scientists and professors of Paris. This council works out the general plan of education for the different schools and directs the various improvements of the University of France (*i. e.*, the whole system of public instruction) necessary for the conducting of the schools, its work being submitted for approval to the ministers. Kindergarten work, manual training, and handiwork, designing, and all other branches of the curriculum are worked out by the council. It invites experts and industrials to assist in working out plans of instruction, as also the technical part of the programme of the school, leaving, however, sufficient latitude for provincial and local specialties. With due regard to local necessities and differences it is expected that the plan worked out by the General Council shall be followed in its general lines by the provincial school authorities. The Council has caused to be adopted now in all the provincial towns the plan of having the manual-labor classes of the primary schools make toys for the children of the kindergarten, to give thereby direction to the labor of the boys and at the same time cover the objection of the municipal councils to the extra cost entailed by the purchase of the objects.

The school systems of other nations may be as complete in their educational facilities, but nowhere, excepting in Switzerland and America, is free instruction so systematically carried through as in France. The same classes and kinds of schools may exist here or there, but nowhere are industrial education and art education made, so to speak, an organic part of the whole system of public instruction.

Manual training, coupled with object teaching, begins at the very bottom of the school system. For the laws, regulations and leading ideas governing manual-labor training, I refer to the part of my report treating on the subject. From the kindergarten schools, it runs through the primary, grammar and high schools and is diffused now all over France. Apprentice-schools for special trades are run now very successfully in Paris and other large towns. It is expected that the theoretical and practical instruction given in them will necessarily produce a superior class of workmen, overseers and superintendents of factories. The success of many of these schools in the results obtained has given sufficient impetus to continuous efforts and has led to the creation of new ones in localities where their need is felt.

. . . .

Higher technical education is principally in charge of the State. The higher branches of learning may perhaps not be carried to so high a state of perfection as in the polytechnical schools and universities of Germany and Switzerland. Nor have I found special trade schools able to vie with the weaving-school at Crefeld, for instance. Intermediate training, however, seems to me to be carried through in France more with an eye to greater diffusion among the masses than I found in any other country, and certainly workshop practice and machine-shop work and especially practical instruction in machine building, etc., are now practised to the extent in which it is taken up in France.

The general aim of the national government in establishing this system of education and the task reserved to itself can be summed up in the following rules and principles guiding its action:

1. To accustom the child to know the tools, to understand their use and to amuse him as much as possible with sketchings, outlinings, modelling and hand work.

2. To assist in the creation of apprentice-schools in industrial centres to the end of giving to the pupils who follow the instruction dexterity in the use of the hand and other corresponding knowledge, to prepare them for entering the *Ecole des Arts et Métiers* or manufacturing establishments.

3. To contribute to the expense of tools and machinery used in the superior, primary and other schools preparing for the technical schools.

4. To raise the standard of admission to the *Ecole des Arts et Métiers* by the greater efficiency given by these secondary primary schools with workshop practice connected.

5. To assist the superior local schools in the support of specially determined industries of the district.

6. To bring the principal schools to the highest degree of technical and scientific perfection by adding new courses of complimentary exercises of special application and to support and encourage, as much as possible, industrial societies who maintain special public courses in the different industrial centres of the country.

A subject not less important in technical education than the system described in the first part of my report, treating of instruction calculated to develop the mental faculties by theoretical and practical instruction in all operations of industry, is the other equally-important branch, *Art Education*. Here, also, France has gone to work with greater thoroughness and systematic consistency than any of its neighbors. In most branches of industry, especially where taste is required to give special value to the fabric or article manufactured, the positions are frequently and entirely reversed. It will be understood how the selling value of an article is enhanced, without any additional expenditure of physical force employed in its production, by the more finished character given it through what may be called for want of a better term, the artistic treatment. This means the whole æsthetic part, the part affecting the eye — coloring, design, form, finish, etc. — as distinct from the mechanical part, covered by a given quantity of labor expended in the finishing or turning of it. Many an article superior in wearing quality, and consequently of higher intrinsic value, is rejected in competition with an inferior one, more pleasing to the eye, however, in virtue of higher skill and taste employed in its ornamentation, coloring, shaping, etc. France has always enjoyed a kind of monopoly in such branches as would be covered by this phase of industrial art, for which her work-people have a natural predisposition, a quality which finds undisputed acknowledgment elsewhere. Of late, however, inroads have been made by neighboring nations into what France used to consider her special domain, mainly by the aid of newly-created industrial-art schools. In consequence of this new competition, much attention is now paid by France to her own art schools. The necessity is felt of bringing up a better-equipped generation. It is held, with great justice, that a greater diffusion of art knowledge through drawing, painting, sculpture and modelling schools will supply industrial art with a stock of trained workmen, who, with the advantages derived from their natural predisposition, will thereby enable French industries to keep up a successful competition in the world's markets.

Industrial art schools are intended to give expression to this aim. But art in general is by no means divided by France into industrial art and high art as in other countries. The Academy of Fine Art and some of the provincial high art schools are only the highest classes of art training of which the other — national industrial art and drawing schools — are feeders. . . .

With all this great progress made in technical and art schools in France, I have always met with the answer, when expressing my high appreciation of what had been done in this direction in so short a time, "*Oui, si vous allez en Allemagne, là vous verrez.*" ("Yes, but if you come to Germany there you will see.") True, in Germany in many directions they are ahead of France; in others, however, by far not so well developed, and I have frequently met with similar remarks in German schools, in regard to France, as in France in regard to their neighbors on the other side of the Rhine. Many German industrial art directors told me that still most of their best ideas came from France, and in this connection it is well and necessary that I should mention another institution of France which gives full value and weight to these expressions.

In Paris there are from fifty to seventy-five studios of designers for industrial art. They cover almost every branch of artistic and decorative industrial pursuit. These artistic designers are men of great skill and taste in special branches of art industry. They usually employ a number of assistants, graduates from art schools and industrial schools of design, and work for all branches of industry, not alone for Paris but for all France. They receive orders from Germany, England and all the other European countries, and not unfrequently from America. These designers, of course, acquire special skill in their branches, devoting their whole time and energy to their special subjects and ransacking all the libraries and artistic productions of present and bygone days, utilizing them for the new styles and fashions they bring out. To a large extent they are the makers of fashions and the whole world pays them tribute. Manufacturers come to them for new ideas, and at the same time give them practical points as to what may be wanted in the coming seasons. For generations, perhaps, the print-works of Mulhouse have been at the head of the industry of calico-printing. From years far back these Mulhouse prints bore the highest distinction for beauty, coloring and design. The same high distinctions they have preserved up to the present day. But whereas they used to employ their own designers in former times, I was told at the time of my visit by the great house of Dolfus, Meig & Co., that they had given up designing in Mulhouse entirely, and now get all their designs made in Paris by the specialists of these studios. Manchester, I was told in Paris, follows to a large extent the same course, as well as American print-works. The same can be said of kindred industries. The manufacturers of the City of Lyons largely follow the same line of procedure. The larger firms, however, keep their own staff of designers upon their own premises, they being more jealous of styles going out their hands into the possession of other manufacturers, unless they keep their own private designers. Some of these employ as many as ten or twenty artists in this way. A great many of the Lyons manufacturers, however, buy designs from designers who have studios of their own, especially for the trade, and I am told there are now forty of such independent special designers, working with assistants in their own studios, in Lyons. When the season is near, they usually call upon the manufacturers, who are their usual customers, and show them rough sketches of new designs and offer them with the right of their exclusive use. The manufacturers then select those likely to draw most when executed. The manufacturers, as a rule, give beforehand a broad hint to the designers of what may be acceptable for the season. On the other hand silk-buyers very often bring their own designs to Lyons from Parisian artists or give

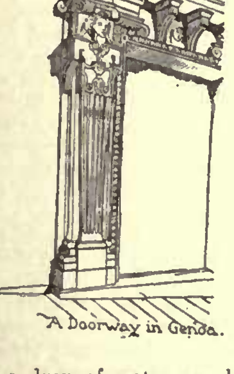
the silk-merchants[1] (manufacturers) of Lyons a general idea of what is wanted in Paris. In this case the manufacturers will at once call in Lyonese designers and have them carry out these ideas. These Lyonese designers derive great help and inspiration from the industrial museum of Lyons, of which I have given a full description in this report. As a matter of course these designers study nature with a very keen eye, the flowers, leaves, etc., of the field and garden are full of lessons to them. All these varied influences and means are employed by them with consummate skill, and truly no silk centre of Europe is able to bring out anything approaching the beauty of the manufacturers of Lyons in silk. It is apparent and must be clear to every thinking mind that art schools are great feeders of industrial and decorative art; but that decorative art and industrial art have been anterior to the schools; and that many another thing is required for prosperous existence of art industries, besides art schools, is equally clear. Without the constant absorption of new and varied impressions, the mind of graduates of art schools would become dry and barren after the effects of art teaching had been consumed in the pursuit of several years' work.

Art museums, and prominently-industrial art museums, are perhaps of greater value than any other educating influence in later life. Of the latter category France is not as well provided, perhaps, as Germany. Efforts are made, however, to collect the scattered treasures and bring them to bear upon local industries all over France. A collection like the one of the Industrial Museum of Lyons, its wealth of direct applications, is not found anywhere else. This museum is in itself an object library, a living history of textile art, keeping always before the designer, the colorist, the workman and the manufacturer possibilities extending into the highest sphere of art, where the past, in language not to be misunderstood, invites the present to like efforts to reach like greatness and perfection. Among the treasures stored in these museums and art libraries, with constant intercourse between artist and artist, designers for industrial art live, so to speak, surrounded by an atmosphere of art. Industrial art education is therefore something vastly more extended than single art schools alone can give. Art schools will not prosper unless there are industries which can utilize results of teaching and training; nor can artistic industries obtain high scope and prosperity without such means of artistic training and assistance as are indicated in my report. Specialists devoting their time to industrial art designing naturally have gone through courses of study in one art school or another. But life, after their first training has furnished them with knowledge and skill, the active lessons of life will have to do the rest.

It seems to me that these industrial artists are very liberally paid in France, and far more so than in Germany. It is important to understand that a good artistic design makes often the chief value of industrial reproductions. These, copied in unlimited quantities, make the higher cost of a good model of minor importance, considering the higher selling value obtained thereby.

One of the highest artistic industrial establishments — that of Barbedienne — in Paris employs some of the greatest artists and sculptors for its models for bronze castings and other objects of art. I am told by the manager of the factory that they pay to the artist twenty per cent of the selling value of all articles cast and sold from the artist's models. — *J. Schoenhof, U. S. Consul at Tunstall.*

THE SIGNIFICANCE OF A SANITARY ANALYSIS OF WATER.



A Doorway in Genoa.

TO understand what importance, if any, is to be attached to a chemical analysis of water, it is necessary to briefly survey the history of the latter from the time it rises as vapor, under the influence of solar rays, from the bosom of the great ocean, until descending upon the Continent as rain, it returns to its source, again to be distilled in endless repetition.

The invisible vapor carried by air-currents inland, at its first precipitation as cloud, commences to absorb the solid and gaseous impurities of the atmosphere; and long before the raindrops reach the earth, they receive appreciable quantities of ammonia, ammonium nitrite, carbonic acid, floating mineral and organic matter, as well as the germs of microscopic animal and vegetable life. To speak accurately, not a drop of water can be found in the natural world which is pure. Fortunately, the substances washed from the air are, with rare exceptions, innocuous. Some of them are indispensable to the life of the globe. Of first importance are ammonia and other nitrogen compounds. Although nitrogen forms four-fifths by bulk of the atmosphere, so inert and apathetic is it in its chemical relations that it is only with extreme difficulty that we are able to force it into combination with other elements. Nitrogen in combination is an essential constituent of proteid matter, with which life in both animals and plants is more immediately associated. Animals derive combined nitrogen from plants; plants derive it from the minute traces contained in the air. The combined nitrogen in the air, it is supposed, is generated by a mysteriously active form of oxygen called ozone. So parsimonious is nature in its supply of this indispensable plant-food, that, while millions of tons of free nitrogen cover the fields, to eke out the supply of combined nitrogen brought down by the rain, the latter form of nitrogen, under one name or another, must be bought by the thrifty agriculturist at about fifteen cents per pound. It brings us now near to our subject, as will be seen below, to observe that the combined nitrogen scantily present in rain-water is accumulated in plants, and in a still greater degree in the animals which feed upon them, and is found in the excreta of the latter, without much loss, in great abundance.

Animal waste is rich in nitrogen, and any considerable accumulation of combined nitrogen in nature is the product of animal waste.

An analysis of sewage or of water contaminated by it should reveal, therefore, an excess of combined nitrogen.

Rain-water on its way to the sea may flow over the surface of the ground, conveying, in suspension and solution, both organic and mineral matter to the nearest river, or it may slowly percolate through earth; and during its long sojourn, aided by the solvent power of carbonic acid, receive in richer proportion than in the other case mineral matter. As a general rule, river-water is soft, but abounds in organic matter. Spring-water is hard, and if its gathering ground is at a distance from the habitations of men, it is nearly free from organic matter.

Well, spring and river-waters commonly contain carbonates, sulphates and chlorides of such bases as calcium, magnesium, iron, potassium and sodium.

So far we have encountered no contamination injurious to life or health in this enumeration; and, going farther, we assert that *there is no proof that human or other filth largely diluted in water-supplies is of itself in the slightest degree unwholesome.* In some instances this sewage contamination promotes the growth in still waters of minute forms of life which under the microscope appear quite alarming; but the history of most of them is as well understood as that of the cabbage, and their physiological action, when absorbed into the system, even less momentous. If any one is too fastidious to permit these interesting creatures to "play tag" in his stomach, it is only needful that the water be boiled and filtered. After this survey, it is time to admit that, beyond the identification of lead, arsenic and a few other toxic substances that do not generally come within the scope of a sanitary water analysis, *chemistry alone is to-day incapable of declaring whether a given water-supply is or is not injurious to life.*

Of what use, then, is water analysis for sanitary purposes? We reply, much, through the indirect connection that exists between the organic matter found and the organized matter which, though unseen, produces disease.

Unfortunately, it not unfrequently happens that a large or small community is smitten with that terrible scourge, the typhoid fever, which without difficulty is proved to have originated in the water-supply.

Chemical analysis reveals no unusual constituent; still, the water is deadly. This is not the place to recite the argument, but authorities agree that the only rational explanation of the phenomenon is the germ theory.

The germ is a minute plant which grows at the expense of its host, and then escapes to fasten upon other victims.

The excreta from some previous sufferer have been carelessly disposed of, and from vault or cesspool found the way, over or below ground, to the well or river which supplies the community. After the usual period of incubation, under favoring conditions it vastly multiplies, and asserts itself by a reproduction of the fever.

It might then appear that the examination of drinking-water should be relegated to the biologist, and conducted by means of a microscope rather than a test-tube; but the mistakes made by the great apostles of microscope cultures, Koch and Pasteur, prove that such a method is as yet too delicate to be practicable.

The object of a chemical analysis is to point out the danger, not which exists, but which possibly exists, whenever drains or cesspools communicate directly or indirectly with well or stream. Drinking-water should be beyond reproach; and as the germs of zymotic or filth diseases naturally would travel by the same routes as the waste water of dwellings, it is sufficient usually to prove the safety of any given water by proving chemically the absence of those materials which are not, indeed, peculiar to sewage, but which exist there in the greatest abundance. The chemist determines for this purpose the amount of free ammonia which exists in rain-water, as we have seen, but only to the extent of about 0.24 parts in one million, and which in much larger quantities indicates the recent addition of putrid animal matter. Again: there is determined the organic nitrogen or "albuminoid" ammonia, which should not exceed, under ordinary circumstances, 0.2 parts, and in large amounts proves direct pollution.

[1] I use the term "merchant" here in preference to that of "manufacturer." Silk manufacture in Lyons is yet conducted largely on the old system. Fully so in the better grades, where artistic skill and taste are most prominently employed. The procedure is a very plain and simple one, and offers great advantages to the merchant-manufacturer. He, after obtaining his orders, buys his tram and organzine. He then gives it to the dyer to be dyed in proportionate quantics of shade and color. The so dyed material is then distributed among the weavers in their homes, and the "manufacturer" has no other part to perform than the examining, folding and shipping of the finished silk. Even the examining and folding are taken out of his hands by special finishers and "appreteurs" (dressers). I intend to dwell more fully on this subject in a later report on "Comparative Industrial Conditions" under which manufacturing industries are conducted in different countries.

As the sewage is eventually exposed to oxidation, it may lose all of the ammonia and albuminoid ammonia; but the results of analysis still disclose them as nitrates or nitrites. These may in turn be destroyed; but there will still remain, as an indestructible indicator of previous contamination, an inordinate quantity of chlorine from the salt consumed by man. In most cases the soil contributes only traces of chlorine. In some instances the total solid matter and the total organic matter suggest important conclusions.

It does not appear that a water-supply is freed wholly from malignant germs by filtration or aeration; and so long as evidence of animal contamination continues, it remains under suspicion.

Having made all possible tests in the laboratory, the chemist's opinion as to the relative safety of different samples presented may be as wide of the truth as a clairvoyant's unless he is permitted personally to inspect their sources or otherwise to know their history.

A proper interpretation is still a difficult matter, and a greater certainty by the microscopic identification of germs in ordinary water examinations is greatly to be desired.—*Henry Carmichael, Ph.D., in the Popular Science News.*

BOOKS AND PAPERS.

A PALE pea-green cover with a little touch of gold, and inside some excellent and attractive typographical work, go very far to give a book value in the eyes of the amateur who is seeking suggestions on the dubious subject of interior decorations, and when there is added a number of valuable illustrations and between fifty and sixty pages of sound advice on such subjects as the hall, the staircase, the library, the parlor, the dining-room, the studio and the bed-rooms, the volume can be said to be of considerable worth, not only to the amateur, who is influenced first of all by what pleases his eye and appeals to his intellectual enjoyment, but also to the more discriminating and captious architect, who is not content with feasting his eye on good printing or clever drawings, but seeks the sanction of his reasoning powers before pronouncing a book on the subject of interior decoration to be worthy a place in his library.

Such is a recent work[1] prepared conjointly by Messrs. Brunner and Tryon. It is no discredit to the book to describe it as being written for amateurs. The preface tells us that the subject-matter was first published as a serial in *Building*. We might expect from this fact that the book would be more professional in its nature, but doubtless Messrs. Brunner and Tryon are wise in not undertaking the invidious task of writing on such a subject for architects, who are the most uncertain of critics and the most difficult to suit, especially in regard to topics about which there is so much room for variations of opinion and for personal feeling as interior decoration.

The book may properly be considered as a sequence to Eastlake, or more lately to Dresser and Clarence Cook. It has an advantage, however, possessed by none of the works of the other writers in that Messrs. Brunner and Tryon are both practical architects and are able to avoid many of the vagaries and inconsistencies which are so apt to creep into the work of an amateur or even an artist who undertakes to deal with topics of an architectural character. We would be almost inclined to paraphrase Bunthorne's criticism of his own poem in *Patience* and say that there is not a word in this volume which is calculated to bring the blush of shame to the cheek of an architect whose client has been an industrious reader of this work. It is consistent throughout and so far as it aims to be professional it is fair without being sentimental, and the advice given is always safe. The authors never neglect an opportunity to remind their readers that after all an amateur is but an amateur and is, therefore, inferior to that superb creature, the architect, who is supposed to tell him what he should admire and inform him how it should be created, as well as what should be avoided and what is not to be indulged in.

So many architects have dealt with those uncomfortable beings who know exactly what they want only they cannot draw it, that for future emergencies it might be well to quote the author's words. "Without understanding genuine appreciation is impossible; without study understanding is impossible, but even with the powers of genuine appreciation, when one can enjoy, select and intelligently criticise, he may still be unable to produce, except in an experimental manner, for beside the cultivated taste, systematic training is necessary to enable one to turn artistic longings into the practical language of the decorator."

The authors acknowledge the fact that architects are often charged with being afraid of color and the fact that when buildings leave the architect's hands the plaster walls often remain untinted, is cited as proof of the assertion. They rather lamely explain the reason for this by saying that it is often better to wait until the building has settled before the building is decorated. We do not remember that we have ever heard just such an excuse for not attending to this very important feature of a building. It is, however, a very good and plausible one, and the next time we happen to be overdriven with work at the office and are too busy to give the decorator any tints for the wall or to pick out wall-papers, we will refer to this book and say that we are waiting for the building to settle.

Messrs. Brunner and Tryon make a good hit at the way in which the architect's work is sometimes brought to naught by the client after the building is all finished and decorated. "Certainly a dining-room designed strictly in the style of François I or a parlor in the manner of Louis Quinze or of the Empire may be a charming apartment, but after all our attention to detail in design we will put Turkish rugs on the floor, Japanese vases on the shelves, and probably modern stained-glass in the windows, and we ourselves, in our nineteenth-century costumes, will be anachronisms."

The authors present the other extreme of style by telling of a man who bought a rug in Cairo, and, returning to his home, took the rug to his architect and said to him: "About this rug — my special and most high-prized favorite — I desire a house and a house, too, that shall in all its features do homage to the rug for which it is built." The story goes that the house was built and dazzled all beholders by the splendor that was born of such Oriental beauty.

Altogether, the book is a decided addition to the literature of its kind. It is not architectural in as far as it is intended for architects, but it is sure to be a good adjunct to the labors of the architect inasmuch as it will tend to elevate the taste and improve the perceptions of those who read. The illustrations, mostly drawn by Mr. Brunner, are excellent both in design and rendering, and the volume has our hearty approval.

A BALTIMORE lawyer, Mr. A. Parlett Lloyd, has had the happy idea of bringing together, in a volume[2] of moderate size, the legal points relating to buildings which cause most trouble to those interested in construction and to the gentlemen of the legal profession who represent them in the courts. It is notorious among architects and builders that lawyers are, as a rule, profoundly, and to them, ludicrously ignorant of the simplest matters of construction. The author of the book before us himself says that "many instances could be cited where legal lights have unintentionally transformed proper contracts into faulty ones, leading to legal complications and the usual consequences thereof," and although he makes no pretensions to instruct his fellows in the art of building, he at least calls their attention to the most important of the conditions under which construction is carried on.

Beginning with a definition of building agreements, Mr. Lloyd warns his readers that "great care should always be exercised in the preparation of these contracts" on account of the multitude of contingencies and technicalities to be provided for, and gives two or three model forms of contract in an appendix suited to various circumstances. The first of these models is borrowed from Carey's Forms and is substantially the same as that in use by many architects in this country; the second, in which a church building-committee is a party, is taken from Lord Grimthorpe's "*Book on Building*," and the third is also from an English work, Emden's "*Precedents of Building Contracts*." All the forms are good. The English models had no arbitration clause, Lord Grimthorpe, as is well known, objecting to arbitrations, and Mr. Emden apparently agreeing with him. The American model contains the arbitration clause in the usual form, but Mr. Lloyd refers in a note to a preceding chapter, where he says that "a clause in a building contract providing for arbitration in case of dispute is generably objectionable for the reason that the architect is the natural and proper arbitrator and in every way competent to decide."

So far we have nothing but commendation to bestow on the book. The contract forms given are perhaps a little long-winded and Lord Grimthorpe's never seemed to us to be quite seriously intended, but it is all the more useful, perhaps, for differing enough from the ordinary models to set those who read it to thinking about the reasons for the variation. In Chapter II, however, we trace Lord Grimthorpe's influence, as an architectural historian would say, in a manner not quite so unobjectionable. This chapter, which is a short one, treats of "Architects and Superintendents," and displays, together with some valuable information, a good deal of that curious incapacity for comprehending an architect's position which seems natural to the legal mind, spiced with a strong flavor of the intentional representation with which architects are treated by Lord Grimthorpe, whose book is, indeed, gravely cited on various points. The most amusing instance of this is to be found in the second paragraph, where we are told that "it has been held in England that the contractor shall build according to the plans for the price agreed upon, but the architect may order any additions or alterations that he pleases, either before or after any of the work is done, without consulting the employer, and even though the latter may object to the alterations, he shall pay for them, and shall also pay the architect a further percentage for designing the same." Thereupon Mr. Lloyd innocently remarks that "such a rule, establishing, as it does, an arbitrary despotism for architects, has not been upheld in this country." The idea of an architect being an "arbitrary despot" over anybody will be novel to most members of the profession, and it ought not to be necessary to point out to a lawyer that if any such "rule" has been upheld anywhere except in Lord Grimthorpe's fertile imagination, it must have been established by the contract

[1] "*Interior Decoration*," by Arnold W. Brunner and Thomas Tryon, architects. With 65 illustrations. New York: Wm. T. Comstock. Price, $3.00, post free to any part of the world.

[2] "*The Law of Building and Buildings*," especially referring to building contracts, leases, easements and liens, by A. Parlett Lloyd of the Baltimore Bar. Boston: Houghton, Mifflin & Co. 1888. Price, $4.50.

between the builder and the "employer," who need not have agreed to it if he had thought it more for his interest not to do so.

In regard to the architect's compensation also, Mr. Lloyd seems to have followed the lucubrations of the autocrat of St. Albans rather than the decisions of the courts. He says that "formerly in England when no agreement was made with an architect, he received five per cent on the cost of the structure and two and one-half per cent for his plans and superintendence." We should have said that this extraordinary presentation of the custom for the charges of architects, which prevails throughout the civilized world, might with advantage have been corrected by a comparison with the schedule itself, which is to be found in the appendix, as well as in every price-book, builders' guide and surveyors' memorandum-book, but Mr. Lloyd takes the Grimthorpe view of the matter and merely informs us that "in 1862 a professional institution of architects issued a scale of charges, all on the percentage system, but in 1870 the Court of the Exchequer declared that this code of the profession was not binding, as its charges were unreasonable, and it was held 'contrary to good sense and justice and not a legal standard.'" The authority for this statement is, we need hardly say, our friend Lord Grimthorpe again, and Mr. Lloyd confesses in a foot-note that he has been unable to find any report of the decision referred to.

Our professional readers will not require to be told that this is a monstrous misstatement of the practice of courts in regard to their charges. The only basis that it can pretend to have is to be found in the rulings, which have been several times repeated in different forms, that a schedule of charges adopted in the profession, but not generally known to outsiders, is not presumed to have formed part of the contract between the architect and his client, in such a way as to prevent a jury from estimating on other grounds, if it prefers, the reasonable compensation which an architect in any particular case has earned. Of course there may be circumstances where five per cent on the proposed cost is evidently either too large or too small pay for the architect's services in relation to a building, and a jury ought not, in the opinion of these judges, to be precluded by the schedule from making its own estimate of what the services are worth, but the idea that the schedule-rates have ever been judicially declared to be an unreasonable compensation for architects' services generally is a very mistaken one and is contradicted by nearly all the cases concerning architects, where, if the five per cent rule is not admitted as a binding and well-known custom, as is now not unusual, no objection whatever is made to evidence showing that a definite sum, amounting to five per cent on the cost of the building concerned, is a proper charge, and the verdict is usually based on this evidence.

In one other point Mr. Lloyd's account of the relation of architects to their employers seems to us to need correction. In speaking of the architects' contract, he says that this "does not survive to his representative, so that if there is a contract to complete a certain work for a certain sum the representatives of the deceased architect cannot recover for the past performance." The moral of this is that architects should be careful never to make an agreement to do their work for a certain sum. It is true that a contract with an architect is a personal one, which cannot be assigned or devolved upon another person, and where an architect is so foolish as to agree to render his long and complicated service for a fixed sum, it might be doubtful whether his heirs, in case of his death before the completion of his commission, could recover any compensation for, perhaps, the work of the best years of his life. Under the ordinary system, however, of payment by percentage on the cost, although it may be argued that the commission for full service being five per cent on the cost, the architect who does not complete his service has no claim for compensation which his heirs can enforce, it has been decided in this country that the representatives of a deceased architect can recover compensation for his uncompleted work in proportion to the amount done.

It would hardly be fair to go farther with criticisms of a comparatively unimportant chapter in an excellent book, so, although certain points, as, for example, the definition that "the superintendent, foreman or boss of construction in this country corresponds with the official known in England as the clerk-of-the-works" invite comment, we will leave them and proceed to mention briefly the ensuing chapters on Building Nuisances, Sureties and Assignees of Contractors, Leases, Restrictions, Taxes and Assessments, Fixtures, Easements, Light and Air, Party-walls, Water, Gas, Highways, Drains and Sewers, Mechanics' Liens and other matters, containing a great deal of valuable matter. As an appendix to the chapter on liens is given an abstract of the lien laws of all the States, in which, however, we find quoted, as the present New York law, the Act of 1880, instead of the very different statute of 1885, by which that of 1880 was superseded.

Last of all comes a set of models for contracts, notices, bonds, leases and so on, the English and American Institute Schedules of Charges, a glossary and an index.

Proposed Monuments. — Sculpture is gaining in public interest, as the increase of public statues shows. Just now six monuments of special prominence are projected or under way. One of the mother of Washington, at Fredericksburg; an equestrian statue to General Zachary Taylor; a monument to President Harrison, one to Francis Scott Key, at Frederick; one for Valley Forge and one for the battle of Point Pleasant in West Virginia. It is also proposed to give Brooklyn a Revolutionary monument that will cost $100,000.

SOCIETIES

ARCHITECTURAL LEAGUE OF NEW YORK.

THE mid-spring reunion and dinner of the Architectural League, now numbering one hundred and fifty-two practitioners, took place, as usual, the first Monday in May, and called forth the largest attendance of any regular meeting in the history of the association, which continues to grow steadily in numerical strength and artistic and professional importance; the practice inaugurated long since of having a paper read by some member at each meeting, was very creditably continued by Mr. A. F. D'Oench, Superintendent of the Department of Buildings of the City of New York, who spoke with ability on *Errors in Construction*; for his long experience, in the first city of the Union, had eminently fitted him for the subject and the task.

The committee on current work, after considerable trouble, were able to show the members a representative exhibit of the architectural efforts in original designing and drawing, of the pupils of three of the principal art institutions of this country, viz.:

Technical Classes of the Metropolitan Museum of Art, New York.
School of Mines, Columbia College, New York.
Architectural Department, Cornell University, Ithaca, N. Y.

Though the pupils' work was not to be compared to that of the famous Paris Ecole des Beaux-Arts for originality in composition, freedom of expression, or cleverness in interpretation, yet the artistic and technical standard was high enough to reflect the greatest credit and give hope and encouragement for the future of our native architectural schools.

The famous designs of Alma Tadema, R. A., for the piano and furniture of the music-room of the New York residence of H. G. Marquand, Esq., were shown for the first time, by the makers Johnstone, Norman & Co., of England.

The lines and ornaments are Greek, and scheme of color and combination of material are inlaid ivory or ebony and *vice-versâ*; the ivories being incrustated roughly and carved in relief, and then faintly stained in soft creams, pinks, delicate russetts, etc., while lumps of coral and mother-of-pearl are discreetly introduced in places, with fine artistic results; the designs are all pure, refined and creditable to the Greek style, while the execution of these extraordinary and unique pieces is not the least remarkable part of the models.

Henry O. Avery, *Secretary, pro tem.*

COMMUNICATIONS

A WARNING.

To the Editors of the American Architect: —

Dear Sirs, — The communication in your issue of Dec. 24, 1887, from "Victim of Bad Faith," concerning the dismissal of an architect, the copying of his plans by a cheap architect, disputed commission, etc. All was settled by compromise: the town has recently voted to change location of building, and a new design will be required, and possibly the same tactics pursued to obtain it, as before, and a patronizing smile offered as remuneration (we have the plan, now let's see you help yourself). Any architects who intend to take a chance in the above, had better ascertain the price which will be paid before they waste any time, and do not let your plans go out of your sight, as the same Pecksniff may be lying in wait.

An Eye Witness.

NOTES & CLIPPINGS

Legends of Artists. — In illustration of the parasitic growth of legend and tradition may be also cited the story told by Tzetzes the Grammarian, some seventeen centuries after the death of Phidias. According to him, Alcamenes and Phidias competed in making a statue of Athena, to be placed in an elevated position; and when their figures were finished and exposed to public view near the level of the eye, the preference was decidedly given to the figure of Alcamenes; but as soon as the figures were elevated to their destined position, the public declared immediately in favor of that of Phidias. The object of the writer of this story is to prove the extraordinary skill of Phidias in optical perspective, and to show that he had calculated his proportions with such foresight, that though the figure, when seen near the level of the eye, appeared inharmonious, it became perfectly harmonious when seen from far below. Now all that any artist could do to produce this effect would be, perhaps, to give more length to its proportions in comparison with its breadth. This, however, would be not only a doubtful expedient in itself, but entirely at variance with the practice of Phidias. His figures, like all the figures of his period, were stouter in proportion to their breadth, and particularly stouter in the relation of the lower limbs to the torso than the figures of a latter period. The canon of proportion accepted then was that of Polycletus; and they were afterwards varied and lengthened in the lower limbs, first by Euphranor, and subsequently still more by Lysippus. Any distortion or falsification of proportion would soley be effective

in a statue with one point of view, and exhibited as a relief; for if it were a figure in the round, and seen from all points, the perspective would be utterly false, unless the proportions were harmonious in themselves and true to nature. Tzetzes is a great gossip, and peculiarly untrustworthy in his statements; but his story is of such a nature as to please the ignorant public, and it has been accepted and repeated constantly, though he does not give any authority for it, and plainly invented it out "of the depths of his own consciousness," as the German savant did the camel. One cannot be too careful in accepting traditions about artists or their works. The public invents its facts, and believes what it invents. Very few of the pleasing anecdotes connected with artists will bear critical examination, any more than the famous sayings attributed on great occasions to extraordinary men; still the grand phrase of Cambronne is as gravely repeated in history as if it had any foundation in fact, and everybody believes that Da Vinci died in the arms of Francis I. Perhaps it is scarcely worth while to break up such pleasant traditions, and certainly the public resists such attempts. It is so delightful to think that the gallant and accomplished King of France supported the great Italian artist, and soothed his last moments, that it seems sheer brutality to dissipate such an illusion; yet, unfortunately, we know that Leonardo died at Cloux, near Amboise, on May 2, 1679 — and from a journal kept by the king, and still (disgracefully enough) existing in the Imperial library in Paris, we know that on that very day he held his court at St. Germain in Laye; and besides this, Lomazzo distinctly tells us that the king first heard the news of Leonardo's death from Melzi; while Melzi himself, who wrote to Leonardo's friend immediately after his death, makes no mention of such a fact. — *W. W. Story.*

The Disadvantages of Professions. — Mr. Wyatt Papworth, whose reputation, as a judicious collector of newspaper-cuttings, has been long established, thinks that the following paragraph which formed part of an article in the *Evening News* of the 20th of January, 1888, should find a corner in this *Journal:* "The law, as a profession, is densely overcrowded. . . . Every term large numbers are added to the profession, averaging some 1,500 per year. Most of these are young men who, when admitted to practice are totally without experience, and are let loose to legally prey upon society at will. Refer to the law journals and columns of advertisements will be seen from fully-fledged solicitors who, after admittance, are unable to find employment. To acquire experience they offer their services to the trade at an average of 25*s.* per week — sometimes for a less sum than a chimney-sweep or a dustman would demand for his labor. These young, inexperienced lawyers are empowered by law to charge at precisely the same rate — neither more nor less — as the most experienced and talented member of the profession. The most trashy advice is precisely the same in price as the most profound. Any one who offers to charge less is looked upon as a legal knobstick capable of outraging the most solemn obligation of the profession, which is to obtain the utmost farthing from a litigant. This uniformity of price, irrespective of quality, is one of the follies of the law. It is a premium on incapacity. Were the lawyers to charge for their skill and be paid according to their worth, only capable men would be employed. The law appears to be a profession of great responsibility and profit, as it undoubtedly is; and parents, without studying the natural inclination and special abilities of their sons, anxious to place them in a position where they can ascend in the social scale, article them to lawyers, and the great majority who are admitted totally fail on account of their not possessing the peculiar talents which ensure success. They are handicapped in the race of life by the conditions inherent in their profession. However able or skilful a lawyer may be, he is debarred from advertising his extraordinary cleverness, cheapness, and superior qualifications, like his brother the tailor, the shoemaker, or the draper." — *R. I. B. A. Journal.*

Vandalism by a Clergyman at Westminster Abbey. — The *Times* reports that at the Westminster Police Court on Wednesday last, the Rev. Watkin Davies, vicar of St. Bride's, Wentloog-with-Coedkernew, Cardiff, Monmouthshire, was charged before Mr. D'Eyncourt, at the instance of the Dean and Chapter of Westminster Abbey, with wilfully damaging the ancient credence table in the St. Erasmus Chapel of the Abbey. A police-constable in plain clothes deposed that he saw the defendant enter the St. Erasmus Chapel, which was sometimes called the Royal Chapel, from the north transept, and chip the base of the credence table with the end of his umbrella. The pieces of stone he knocked off he put in his pocket, and witness then took him into custody and asked him what he meant by such conduct. The defendant's answer was that he was not aware he was doing any harm, and that he had only taken a few pieces of the stone as a relic. Mr. Thomas Wright, clerk-of-the-works at the Abbey, said that many of the ancient monuments were damaged by persons chipping pieces away as relics. The pieces of stone chipped off the table, which were about the size of a walnut, were handed to his Worship, who asked the defendant what answer he could make to such a charge Mr. Davies said he had nothing at all to say, except that he did not know that he was doing any harm. Further questioned by Mr. D'Eyncourt as to his motive, the defendant said "I was picking the pieces for relics." Mr. D'Eyncourt. — You really ought to know the value of ancient monuments and to venerate them accordingly. I must fine you 40*s.* for the wilful damage.

TRADE SURVEYS

Stock speculators are very impatient over the unfavorable market conditions. There is no inducement to buy and sell in a large way. Stocks, like values in other directions, have a downward tendency, while gross earnings on a great many railroads are increasing, net earnings are declining. On the New York Central, Erie, Pennsylvania and Baltimore & Ohio, the gross earnings for six months ending April 1, showed an increase of about $3,000,000, while the net earnings for that time showed a decrease of about $1,000,000. The same ratio runs through nearly all the leading systems, West and East. While the volume of traffic is increasing, the compensation to the companies for their service is declining. Hence, there is less speculation in stocks, less railroad construction, and a disposition to reduce expenses for equipments and supplies, and to throw off men wherever their services can possibly be dispensed with. The railroad companies, in many cases, are animated with a desire to let organized labor know that labor is not in such urgent demand as might be supposed. The failure of the C. B. & Q. strike, has suddenly disposed of a good many grievances among railroaders. Just as failures in other directions have served to teach labor that the time to strike has either passed, or has not yet come. One of the strong factors in the situation three or six months hence will be a more contented body of labor. Another of the strong factors that will go to make up a healthful condition of affairs next autumn and winter, will be hard-pan prices. The downward tendency which is now at work in every direction, is bringing railroad freight rates in its course. The wars in the Northwest are not likely to be adjusted, excepting on a lower basis. The Canadian Pacific now controls the "Soo" route, and that may be taken as evidence that there will be no combination for higher prices on the trunk lines West of Chicago. There is barely enough traffic on the trunk lines East, to satisfy all members of the pool. Yet, railroad authorities state — what is, no doubt, a fact — that in the aggregate, railroad traffic is increasing; that less injustice is done to shippers, big or little, and that the benefits of the Inter-state Commerce Law are now being practically realized in the way that the framers of that law anticipated. The producing capacity is still being restricted within the limits designated by actual demand. There is not a single industry that can be named, wherein overproduction is visible. The iron-making capacity is running to about 75 per cent, as nearly as it is possible to estimate from all reports received from week to week; rail-makers are booking a few large and small orders, but there is very little business now in hand or in sight for the summer or fall. Prices remain where they were three or four months ago. Alabama pig-iron has been unsettling prices throughout the North. Most of the furnaces there are sold away ahead, while Pennsylvania and Ohio furnaces are standing idle, or fearing the competition from the South. Freight rates have been lowered 20 cents per ton on Southern and Western roads, and one railroad company in Eastern Pennsylvania has reduced coal and freight charges, and iron-makers are awaiting a similar course by two other railroad companies, in order that they may be able to compete successfully with the iron of the West and South, which for some time past has been creeping into their territory. The building situation throughout the United States, may be given in a nutshell, as follows: In the New England States, there is not, as yet, quite the same degree of activity as there was last year; in many towns, there is the promise of an improvement. Manufacturing establishments will have their capacity improved somewhat, but there is no general expansion probable. The trade conditions are favorable. Boot and shoe manufacturers are even busier than last year; electrical-supply establishments are busier; paper-makers are making and selling more paper than a year ago, and paper-making capacity is being increased in New England and also in Wisconsin. The smaller industries throughout the East are all fairly well supplied with business, but the manufacturers are careful to avoid extensive purchases of material; and yet, the prediction is frequently heard, that the summer and fall trade will make up for the winter and spring. The faith in this improvement is deep and widespread; it is met with among the builders, architects, mechanics and shopmen of the West. Throughout the Middle States there is more activity in building, especially in cities like Philadelphia, Pittsburgh, Buffalo and Albany. Philadelphia has taken a sudden spurt of activity, and the distribution of lumber and building material has been gratifying. A great deal of work is underway throughout the interior of Pennsylvania. It is probable that the Reading terminus will be authorized at Twelfth and Market Streets, Philadelphia, and that work will begin before the end of the year. A company has been organized to construct tunnels running at right angles to each other through the city for passenger traffic. From present indications, 6,000 small houses will be built. Building operations are being actively pushed in Pittsburgh, and there is a healthy activity in all the manufacturing towns of Ohio and Indiana. Forty firms have located at Findlay, O., within four months. There are twelve glass factories in that town, and others are coming. The coal output of Ohio is increasing, notwithstanding the Natural gas development. Indiana gas-fields are also attracting manufacturing enterprise, though the coal-fields of that State and Illinois are not keeping pace with the development in newer fields farther West. The distribution of lumber during the past thirty days has dissipated the doubts which manufacturers and dealers entertained a few weeks ago. Prices have not been cut except in isolated cases, in any markets throughout the country. The manufacture of lumber has been retarded by natural causes and by judicious management in the Northwest, while in the South its manufacture has been stimulated by Northern capital and enterprise, and by a demand which seems equal to the consumption of every car and cargo that thus far has come to market. The architects and builders from New York to Duluth and Omaha are pleased at the building developments of the past few weeks; every Western city feels the stimulus of an improving demand. The favorable reports heretofore made concerning industrial activity in the South, can only be repeated. Upwards of 100 cotton mills have been projected since last September; the bulk of these have been undertaken, or will be at an early day. Inquiry with manufacturers of textile machinery, corroborates the scattering statements from projectors and promoters, concerning the present and prospective activity in demand for all kinds of textile machinery used in the South. The manufacture of cheviots and dress goods of the higher grade is being introduced in an experimental sort of way, as well as silk culture and manufacturing, and there appears to be no reason why such enterprise should not be sufficiently regarded to lead to further like efforts. There is a downward tendency in prices, which for the time being, is repressive in its nature; but the outcome will be, as it always has in years past, a strengthening of the foundations of trade and a widening of markets. Vast timber regions have been opened in the South, and a doubling of the supply of Southern lumber is a strong probability within the next two years. There is a scarcity of coke in the South, but the enterprise of Southern manufacturers will be equal to this emergency. Southern railroad managers seem to have caught the spirit of progress, and are working hand in hand with the manufacturing and agricultural interests to increase the industrial activity, that they may profit by the resulting increase in traffic. The manufacturers of brick are barely able to meet the current requirements; an increasing demand is met within country places where lumber has heretofore been mainly used. There is an improving demand for slate and for fireproof material. The manufacturers of pipe of all kinds, excepting for natural-gas, have been able to keep their establishments quite busy.

S. J. Parkhill & Co., Printers, Boston.

THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. XXIII. Copyright, 1888, by TICKNOR & COMPANY, Boston, Mass. No. 647.

MAY 19, 1888.

Entered at the Post-Office at Boston as second-class matter.

CONTENTS

BY the burning of St. Paul's Church in Buffalo, the cathedral church of the Episcopal diocese of Western New York, not only is a severe loss inflicted upon the community interested, but a lesson is taught in regard to the danger of using natural gas for fuel which should be laid to heart. The heating furnaces in the church were supplied with natural gas from the mains belonging to the Company which controls the wells. By some derangement of the valves at the works, according to the newspaper accounts, the pressure in the mains appears to have been suddenly increased to a dangerous degree, and several meters burst, and small explosions occurred, in various parts of the town, while in the cathedral the escape of gas was so copious that as soon as fire communicated to it from the furnaces, the doors were blown out, together with portions of the windows, and flames immediately followed, in such volumes that the whole interior of the building was destroyed in about half an hour. Soon after the arrival of the fire-engines on the ground the roof fell in, and nothing now remains of the church but the walls and spire.

A STRANGE accident occurred a few days ago at Columbus, O., where a vaulted floor gave way on the removal of the centring, falling upon the men employed in taking out the timbers, killing two and severely injuring the third. The arch, which is said to have been in one span, about twenty-three feet wide, was of brick, levelled up with Portland cement concrete. According to the accounts, the rise of the arch was but two feet, and we are not told what sort of abutment was provided to resist the great thrust of such an arch, so that it is not difficult to account for the catastrophe on several suppositions, one of which would be that the rigid Portland cement concrete may have separated from what might have been the compressible ring of brickwork beneath it, so as to allow both to fall independently of each other. We hope, by the way, that some one is keeping notes of all the building accidents in which Portland cement plays a part. As used by inexperienced persons, it is certainly a dangerous material. Our professional brethren abroad have learned to take various precautions against over-liming, under-burning and other defects, of which we know little, and as we, presumably, often get the cement shipped to us which the foreign engineers have rejected, it is all the more important to be on our guard.

ANOTHER building accident is reported from Pennsylvania, where the floor of a public hall gave way during a school exhibition, precipitating five hundred people a distance of twenty feet to the ground, killing two outright, and seriously or fatally injuring many others. As usual in such cases, the central portion of the floor gave way first, so that the people in the room fell from all portions toward the middle, probably saving the lives of those nearest the sides of the room, at the expense of those near the centre, who were underneath in the final crash. To all appearance the accident was due simply to the insufficiency of the floor-timbers. Very few builders take the trouble to calculate the resistance of the beams which they use over spans out of their ordinary experience, and it is not likely that the strength of the floor was much greater than that of an ordinary dwelling-house, instead of being, as it ought to have been, at least four times as great.

MRS. CANDACE WHEELER, of New York, seems likely to be long remembered in this country, not only for her brilliant talents as an artist and decorator, but for her successful efforts in behalf of those of her sex, who from inclination or necessity, earn their living by their own efforts. In her own profession, Mrs. Wheeler has successfully united the labors of a large number of women by the organization of the Society of Associated Artists, whose beautiful work in decoration and embroidery is well-known to most architects, and, applying a similar idea to a more extended form of association, she is said to have been the founder of the Woman's Exchange in New York, which has served as the prototype of many others in various cities, and has opened to skilful and industrious women a market for their productions such as they could not have hoped for a few years ago. The latest scheme of this sensible and clear-sighted lady, is, according to the *Mail and Express*, the establishment of a hotel, or rather, a sort of coöperative club, where fifty or a hundred women, whom circumstances have made self-dependent, may make pleasant homes for themselves. It is intended to have the establishment managed, like a club, by committees of boarders and stockholders, so that the women interested may enjoy the pleasure of regulating to a certain extent their own household affairs, while the economy possible to combined housekeeping will, it is thought, enable the managers to keep the expense of pleasant rooms and comfortable living down to about six dollars a week, even in New York. How much pleasanter to most women such a place would be than a second-rate boarding-house, it is hardly necessary to point out, and there is no reason why the plan should not prove completely successful as a business enterprise. It is notorious that the largest and best hotels in Europe are frequently, if not generally, managed by women, and the endless detail of foresight and economy necessary for such work seems to be particularly congenial to the sex. Women, moreover, care very little about the pretentious extravagance which is apt to bring masculine clubs to grief, and, so long as they can live comfortably, and with a certain amount of pleasant company, in a clean, attractive house, which they have some voice in managing, most of them will be quite content, without trying to dazzle strangers with affectations of wealth. For such persons coöperative housekeeping is a simple matter. It has been repeatedly tried in New York on a small scale, with complete success, and a house for not more than a hundred women, planned with economy, so as to save as much as possible in the important item of rent, ought to be certain of paying dividends, as well as expenses. The building which it is proposed to erect will be fireproof, and is intended to cost, with the land, between one and two hundred thousand dollars. The necessary amount has not yet been fully subscribed, but a considerable portion has been promised, and as soon as the rest is secured, the construction will begin.

AFTER twenty years of waiting, the Arcade Railway Company, of New York, is said to have completed the contracts for the construction of the first five miles of its line, from the Battery to the Grand Central Railway Station on Forty-second Street, and it is expected that work will begin in a few days. The names of the contractors have not been made public, but the Directors of the Arcade Company are satisfied of their ability to carry out the work, and various bankers in France and Germany are reported to be ready to take the bonds which are to be issued in payment for construction as security for advances of the necessary cash. According to the New York *Times*, the Company has already spent in surveys and other preliminary work about four hundred thousand dollars. Large as this sum seems, it is not perhaps too much for such minute and thorough study of every detail of location, construction and cost as has been going on for the past twenty

years, and it is a satisfaction, after the developments in regard to the Broadway Surface Railway, to be able to credit the positive assurances of the Arcade officials, that not a dollar has been used to influence legislation, or for any other secret or dishonorable service.

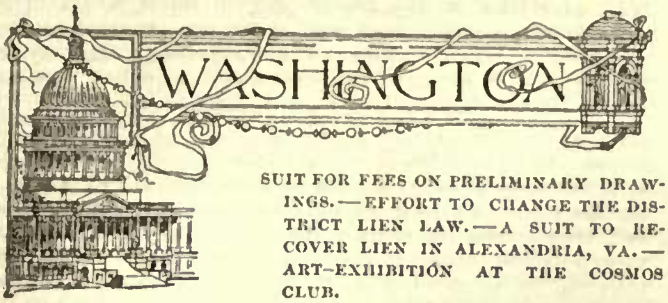
SOME lectures have been recently given at the British Museum upon the art of ancient Babylonia, which are reported in the *Builder*. It is hardly necessary to say that since the discovery of several subterranean stores of cuneiform inscriptions, made upon cones of clay, our knowledge of Babylonian ways has become greatly enlarged, and it may not be long before as much is known of the history of Mesopotamia as of ancient Egypt, where, as some one says, the events which occurred in the fifteenth and sixteenth centuries B. C. are recorded with greater precision, and in more minute detail, than the history of any European State in comparatively modern times. It is not long since a great number, some forty thousand, we believe, of inscribed cones were discovered, and sent to the British Museum to be deciphered, and a few months ago, while hardly more than a beginning had been made in translating the first consignment, two hundred thousand more were dug out of a subterranean chamber under the mound of Tel Ibrahim. This chamber is supposed to have been one of the "stack-rooms" of a great public library, of which five are known, from inscriptions, to have existed, in what we should call the five university towns of the Empire, Borsippa, Kutha, Larsa, or Larissa, as some maps call it, Eridu, and Babylon. Not only is the existence of these centres of learning well attested by the inscriptions, but we know the character of the sciences principally cultivated in each, Eridu and Kutha having been the seats of theological knowledge, while Borsippa was the centre of technical instruction, and Larsa of mathematics; and the library attached to each was mainly devoted to books, or rather tablets, of appropriate character. Not only were these libraries well stocked, but the books were arranged and catalogued with such skill that the authorities of the British and the Continental museums have adopted the ancient system as being still the best for the sort of material with which it dealt. Most people will remark the similarity between this sort of literary, or rather educational enthusiasm, and the passion for scholarship which still exists among the educated Chinese, and it is not very surprising to find that it is now regarded as certain that the Chinese writing is intimately related to the cuneiform character, as if the people of Mesopotamia had diffused civilization eastward to the Chinese valleys, as well as westward to Asia Minor, and indirectly to Greece and Rome.

A SCHEME for reclaiming the bed of a lake is now in process of execution in Egypt, where, among other important engineering works, the water of Lake Aboukir, a salt pond, covering about fifty square miles, and situated near the city of Alexandria, is being pumped into the Mediterranean. According to the account in the *Pall Mall Gazette*, the lake was formed about two hundred years ago by an irruption of the sea, which, in a violent storm, broke through the high ground near the shore, and overflowed thirty-one thousand acres of a very fertile and populous district in the suburbs of Alexandria. After the establishment of English control in the country, a company was formed to reclaim this valuable territory, and on the 8th of March last two enormous pumps began to lift the lake into the Mediterranean at the rate of four hundred and sixty tons per minute. We will not attempt to quote the *Pall Mall Gazette's* amazing statements of the efficiency of the pumps; it is enough to say that the officers of the company expect to have the lake drained in about a month. The next problem is to get rid of the salt, which, in a rainless country, would render the reclaimed soil unproductive for many years, but the company's engineers have provided for this by arranging to intersect the lake-bed with ditches, after which, at the time of flood in the Nile, the great Mahmoudieh Canal will be cut, and fresh water will be allowed to flow into the lake. This will dissolve the salt, and, after a suitable interval, the pumps will again be set at work, and the land, now free from salt, will be prepared for cultivation. The ground is said to be so rich and so near the great market of Alexandria, that it will easily bear a rent of fifty dollars per acre, and, as the pumping will cost only about two hundred and fifty thousand dollars, and, by concession from the Government, a portion of the taxes on the territory is to be remitted for a term of years, the managers of the enterprise expect to make a profit of four or five million dollars.

A MEMBER of the London School Board writes to the *Builder* a careful and very complimentary description of Heine's patent system of house-heating. This system appears in two forms. Under the first, as applied to school and dwelling rooms, it seems to consist in setting up in the room what we should call a "school stove," or a "Fire-on-the-hearth" stove with the blower permanently closed. Fresh air, as in our apparatus, is brought from out-of-doors by a pipe to the space between the inner and outer shell of the stove-casing, and, after coming in contact with the convoluted smoke flue, as well as the outside of the combustion chamber, escapes into the room by an opening in the top of the stove. The only novelty about the affair seems to consist in a sectional arrangement of the castings, by which any portion can be taken out and replaced at pleasure. In the "Central Heating" form of the system, the stove of the other form is magnified to a furnace, which is placed in the cellar of the building to be warmed, and delivers fresh air, received from the outside, warmed into the rooms above. A cold-air supply to the cellar, with suitable valves, allows cold air to be mixed with the warm current before delivery to the upper rooms, so that the temperature can be regulated very accurately. The device by which the temperature of each room is known at all times to the fireman in the basement is, we think, new in this country. In each room are placed two thermometers, one large one, permanently fixed to the wall, and a small one, which appears only in a cavity by the side of the room, communicating with a flue extending through the masonry to the cellar. When the fireman wishes to ascertain the temperature of a given room, he pulls one side of an endless cord, which passes through the flues in the walls to the cavity containing the small thermometer for that room, and the thermometer is brought down for him to inspect and is then returned by the same means to its place.

THE *Revue Industrielle*, which, like all the other French technical journals, interests itself just now in city railways, has been publishing statistics of the New York elevated roads, and now gives some figures in relation to the London Metropolitan lines. Every one knows that the traffic on the London roads is very large, but the actual figures are rather startling. The busiest local station on the underground railway is that of Clapham, or Clapham Junction, where, on an average, fifteen hundred trains a day are received and despatched. Of course, a large part of these are freight-trains, but from seven o'clock in the morning until midnight a passenger train leaves the Clapham Station every ninety seconds. The station itself covers about twenty-three acres of ground, and contains nine parallel tracks, besides spurs and branches. The ticket offices are situated in a tunnel, which traverses the station beneath the tracks, and stairs ascend from this tunnel to the different platforms. Among the terminus stations, that of the Great Eastern Railway in Liverpool Street, near the Bank of England, is the busiest, despatching eight hundred trains every twenty-four hours. When the re-arrangement of the station, now in progress, is finished, it will contain fifteen tracks, thirteen of which will have platforms beside them, varying in length from five hundred to a thousand feet. This is only one out of seventy-three stations that the Great Eastern Railway possesses in London, forty-five of which are for passengers alone. The ordinary local train on the Great Eastern lines consists of fifteen cars, each containing fifty seats for second or third-class passengers, or thirty-two seats for first-class, the trains averaging six hundred places in each. All the stations on this, as on all the other railways terminating in London, communicate by means of underground lines, so that a passenger arriving at any station, from any part of England, can be transferred to any other part by stepping across a platform and waiting until the proper train comes along.

THE architects who interest themselves in sanitary matters, and who sometimes feel as if they were looked down upon by the lofty-minded artists who cannot bring their thoughts to dwell on such details, may be encouraged to know that no less a personage than her Royal Highness the Princess Christian of Schleswig-Holstein, Princess of Great Britain and Ireland, third daughter of Queen Victoria, has made an excellent translation into German of Dr. S. Pridgin Teale's lively book on house-drainage, which, with the startling illustrations of the original, has just been published, under the name of "*Lebensgefahr im Eigenen Hause*," by Lipsius and Tischer, in Leipzig and Kiel.



SUIT FOR FEES ON PRELIMINARY DRAWINGS. — EFFORT TO CHANGE THE DISTRICT LIEN LAW. — A SUIT TO RECOVER LIEN IN ALEXANDRIA, VA. — ART-EXHIBITION AT THE COSMOS CLUB.

RECENTLY a Washington Architect, Mr. T. F. Schneider, had occasion to bring suit against a client, Mr. John F. Waggaman, for payment of fees due on preliminary drawings. It was a jury trial in the Circuit Court, and the case was as follows: Mr. Waggaman ordered the drawings to be made for three houses, but did not wish the complete working-drawings until he should fully make up his mind whether he would hold the lots or not.

The preliminary drawings were duly prepared, Mr. Waggaman being consulted and coming to Mr. Schneider's office repeatedly to give instructions. He wished houses to cost five thousand dollars each, but his instructions required houses that would cost six thousand, and so the architect informed him. After patiently waiting for the order to complete the work, Mr. Schneider sent in a bill for preliminary drawings, $150, being one per cent on $15,000, the amount which Mr. Waggaman desired the houses to cost. The bill was returned endorsed, "I owe you nothing." Hence the suit.

Mr. Waggaman's defence was, that he expected to pay for the drawings in case he should use them.

Mr. Schneider proved that nothing was said as to fees for such work, and that he had charged only the usual fee. The jury made an award of one hundred dollars to the architect. Some were for the full amount of the claim, others were for fifty dollars, and they awarded the mean or one hundred dollars. This case could only be called a partial success, as the jury did not allow the full rates customary among architects and as endorsed by the American Institute of Architects. But it proves that juries are becoming more enlightened than they were not many years ago.

The District Lien Law is very defective, in that it gives dishonest contractors and sub-contractors an unlimited opportunity for swindling the owners.

The lien need not be filed against the property for ninety days, and contractors, sub-contractors, material-men and laborers have the right of lien. No notice is required for ninety days after completion of building. Sometimes a lien might be filed a year after the material was furnished, for which the claim was made — for instance, stone laid in footing courses. Many are the instances where owners have found it necessary to pay twice for the same work. They cannot protect themselves except by bond running for three months, and all know that this is not a guaranty, neither are small builders or small house-holders usually prepared or willing to undergo the formality of making or giving bonds.

A bill was introduced into the House of Representatives recently to amend this law with the following notice clause:

"*Provided further*, That no lien shall attach for materials contracted for or furnished, unless the person contracting for or furnishing the same, before furnishing the same, gives notice in writing to the owner of the property to be affected by the lien, if such owner is not the purchaser of such materials, that he intends to claim such lien."

This is nearly the same clause that is in the Massachusetts Lien Law.

Congress has done nothing yet in the matter except to have the bill read twice, referred to the Committee on the Judiciary and ordered to be printed. It is hoped that action will soon be taken and the bill passed, as it prevents many timid persons from building.

An interesting case was decided in Virginia recently, where the lien law is very much like the one in force in the District, but bearing less severely on the property-owner. The case was as follows:

Mr. Summers, the defendant and owner, contracted with Mr. Stoutenburg, a builder, to erect a house in Alexandria, Va. Mr. Stoutenburg ordered material and mill-work from a Mr. Peake, a dealer in builders'-supplies, who in turn ordered the same from Atcheson & Bro., lumber dealers and building mill-workers, who furnished the material mentioned, the same being used in the construction of Mr. Summers's house.

The Judge in summing up the case states that in his opinion, it makes no difference whether the goods were furnished in the first place to Mr. Peake, and then delivered to Mr. Stoutenburg, or directly to Mr. Stoutenburg; further, that it makes no difference whether it was charged in a running account to Mr. Peake, and an effort was made by Aitcheson to collect from Peake. "The house is responsible, because plaintiff [Aitcheson] furnished material for its construction."

The Virginia Lien Law summarized it as follows:

Contractors, sub-contractors, material-men and laborers have a right to liens. Contractors must file their notices in the Register's Office within ninety days, and others who enjoy the right, within thirty days after completion of work or the delivery of material. The lien must be enforced within six months after last payment, or it lapses. The owner must have actual notice at time of the lien being filed.

The lien is prior to all debts, mortgages, etc., made after the contract for building is signed.

The Judge further says: "Of course, if an express contract between the party furnishing material and the owner of the land is necessary to the existence or creation of a lien, then notice would be unnecessary." The question in this instance was really between G. A. Mushback, Peake's assignee, and Aitcheson & Bro., the owner having retained sufficient money to pay either to whom the court should allow it.

The Judge says, "I do not think it difficult to determine between these two claimants which has the better equity . . . but I have contented myself with considering the sole question presented in argument, to wit: Whether or not under the facts disclosed by the record, if the plaintiffs (Aitcheson & Bro.) were in position to create a lien upon the building of Summers for supplies furnished by them and used in its construction. I am of opinion that plaintiffs are entitled to the relief they ask."

During the first part of April an exhibition of oil and water-color paintings, etchings, drawings and sculpture, was held in the assembly rooms of the Cosmos Club. It was a local exhibit, or rather, the exhibitors were residents of Washington City. The walls were quite well covered and the work was creditable to Washington artists. Several landscapes in oil by Max Weyl, portraits by A. G. Heaton and E. A. Poole, were the most notable in their department.

E. J. Major exhibited a very effective flower piece — a large bowl filled with poppies. Mr. Major is the winner of the Harper prize-scholarship in Paris.

The water-color exhibits were fair; one very good marine landscape by Holmes, was broadly and effectively treated, the colors, lights and shades being well handled.

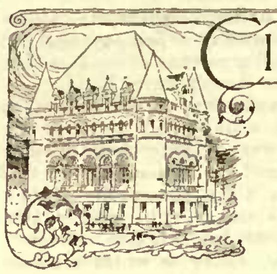
The Washington League, a number of students, had a department to themselves, and show some very interesting and artistic work for students. Their water-colors and sketches being particularly effective.

The Architectural exhibit, the branch in which we are most interested, was limited to a few contributors. The exhibits of Messrs. Cluss & Schulze were, by far, the most important. The first was a perspective of the new Catholic University at Washington, the design to which was awarded the first prize in the competition, while the commission for the work was given to Mr. Baldwin, of Baltimore, who was not a competitor but a relative of a high church official. The invitation implied that the commission would be given to the successful competitor, but the authorities, it seems, where not technically bound to put such a construction on their invitation. The same architects also had on exhibition their design for the Mexican Monument, in which they are not only the successful competitors, but for which they received the commission. The design submitted by Messrs. Cluss & Schulze, for the Parliament Houses in Germany, was an imposing and effective design in Lombard Gothic, which, I understand, received the first rating for that style in the competition. The drawings are well rendered, and the whole is worthy of a much more extended notice than I can give it in this letter. Two of Mr. Schulze's pen-and-ink sketches, "The Natural Bridge, Va.," and "A Portrait of Michael Angelo," are excellent examples of such work.

Mr. Glenn Brown contributed two competitive designs, one for the Kansas City Exchange, and the other for the Soldiers' and Sailors' Monument of Indiana, both a free treatment of Romanesque work, the drawings being simply in outline. He also contributed the drawings for the old colonial work recently published in the *American Architect*, interesting only from association and showing what our grandfathers did.

Mr. Robert Stead contributed two perspectives, one of an apartment-house, the other a private dwelling. Although there has undoubtly been a large number of effective and artistic residences erected in this city in the last few years, there were none worthy of mention on exhibition. The only ones being two sketches in color by H. L. Page, two by Henry Law and one by Messrs. Hornblower & Marshall. This lack of private work in the exhibition may be attributed to the fact that few architects make show drawings of such buildings, contenting themselves with making the necessary working-drawings.

A PROTECTOR FROM ELECTRIC SHOCKS.— The danger which employés of electrical stations using high tension currents run by accidental contacts is well-known. In view of this, notes the New York *Sun*, P. B. Delaney of that city has devised a pair of bracelets and a pair of anklets connected by flexible cords and arranged to be worn by a lineman in such a way that if he should close a high potential circuit through his hands it is hoped that a considerable part of the current would be switched off his body away from his vital parts to expend itself by passing out through the skin or some part of the body removed from the vitals. Electricians say, however, that there is a question whether the current will not prefer to continue in the man rather than leap out when it met these bracelets, which would offer somewhat higher resistance than the human body. Of course the inventor believes that the fluid would prefer the matter to the flesh.



THE OUTLOOK. — CHAMBER OF COMMERCE BUILDING. — NEW CITY-HALL. — COMING EXHIBITION OF ARCHITECTURAL WORK.

TAKING out three or four important buildings that are under way in this city, the general cry is that there is a dulness in the building line, the like of which has not been seen for several years, and the outlook does not seem encouraging for the season.

Just why this state of affairs exists is hard to tell, but, no doubt, the recent bank failures have had much to do with the depression, as it took several millions of dollars out of the city, and other cities received the benefit; our loss is their gain.

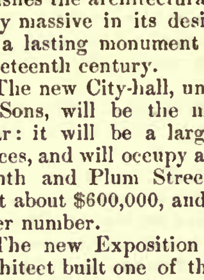
Of the important work now going on, the first and foremost is the Chamber of Commerce Building designed by the late Mr. H. H. Richardson, and it is, no doubt, his best work, as it was the last building he designed, as he died before the drawings were entirely completed. The walls of the building are now completed and the iron roof is about finished, and as this splendid piece of architecture nears completion, it bespeaks the genius of the architect and satisfies the architectural eye. It is built of light colored granite, is very massive in its design and proportions, and when finished will be a lasting monument to the advanced architectural ideas of the nineteenth century.

The new City-hall, under charge of architects Samuel Hannaford & Sons, will be the most important building started during the year: it will be a large fireproof building containing all the city offices, and will occupy a large part of the square bounded by Eighth, Ninth and Plum Streets and Central Avenue; the building will cost about $600,000, and a more detailed description will appear in a later number.

The new Exposition Buildings by Siter and McLaughlin (each architect built one of the two buildings) are finished and present a large appearance; and speaking of these buildings reminds us that it is the intention to have the best architectural exhibit (drawings, photographs, sketches, etc.) that has ever been held in the Central States; every effort is being made and every assurance is given that the undertaking will be a success. This exhibition is open to all architects, and transportation of pictures both ways will be paid by the Commissioners. Architects who desire to take part in this great opportunity (and all are urged so to do) should communicate soon with Mr. Charles Crapsey, Chairman of the Committee, having the matter in charge. These exhibits do much toward bringing the architects and general public together, and should be taken advantage of.

The Cincinnati Society of Architects, with nineteen members, had their annual meeting recently, and the following officers were elected to serve the coming year:

President, Charles Crapsey; Vice-President, H. E. Siter; Secretary, Gustave Drach; Treasurer, W. M. Aiken.



THE PROGRESS NORTHWARD OF THE RESIDENTIAL QUARTER.— DETACHED HOUSES IN TOO SMALL "GROUNDS." — FOUR HOUSES ON THE LAKE-SHORE DRIVE.

THE rapid movement of the centre of fashionable residence on the North Side, still farther towards the north, is quickly building up with costly houses a district which but five or six years ago was almost a barren waste of sand, or a dumping-ground for the omnipresent old tin can. The improvement of the street upon the very shore of the lake was begun by widening it and making it a part of the boulevard system, thus placing it under the control of the Park Commissioners. It has now been macadamized and planted with trees, so that these improvements, together with the magnificent view it has off over the lake, have tended at once to make this Lake-Shore Drive and its vicinity the most desirable residential part of the North Side, and it is, without doubt, destined to soon become the handsomest and most aristocratic portion of that quarter of the city. There are now practically finished on this drive a group of four houses probably finer than any four others within the same radius in the city. The one on the corner of the Drive and Schiller Street is from plans by Richardson, while the three houses immediately north are by three of the best known firms in Chicago.

When standing at a distance and looking at the group one cannot but be surprised, first of all, that in building such palaces the owners should have been so niggardly of land. Could there have been fifteen or twenty feet more of yard at the side of each house, the appearance of every one would have been improved at least fifty per cent. As it is, they are jammed together as if the owners were men either of the most limited means or most niggardly spirits.

If a yard is wanted, by all means have it large enough to produce some effect, but if only light-shafts are needed, why should a house be built as if in the midst of fine grounds? If people desirous of a fine effect would but spend more on the ground and less on the building, they would get a great deal more for their money than they now do. However, real generosity of surroundings to a house seems to be something that cannot be understood in this part of the country. Even the present United States Minister to Belgium, a man of great wealth, owning among other property an entire vacant block on the North Side, crowded the house he recently built up into one corner of this same block, leaving no grounds either at the north or east sides. This state of affairs probably arises greatly from the fact that people insist on building a palace with exactly the same plans as a cottage — except that each room is proportionately enlarged — and also insist on erecting this palatial cottage as if in the country, but still have it in the city; instead of frankly occupying the whole ground and not trying to show any lawn except possibly at the front. Mr. Richardson alone seems to have appreciated this fact, and he has practically walled in his entire lot, leaving lawn only on the side of the drive. In looking at these houses one is next surprised (and, it might be added, disgusted) to find that with a single exception they all have only stone-fronts, while the sides and rears are of common "nine dollar yellow brick." Involuntarily one thinks of a gorgeous necktie covering up a dirty shirt. The more one studies these buildings, the more is one impressed with the fact that, notwithstanding certain impracticable things, Mr. Richardson is the only one who has truly studied his problem as a unit or whole; the others have all worked out their plans in detail and then put the parts together, while he evidently studied the problem as a whole, and the details come where they could and as they would. Even the wall joining house and barn binds the entire construction together in one design.

Taking the houses in detail and commencing at the south one, which is Mr. Richardson's, the general lines are extremely simple and very charming; especially pleasing is the grouping of the openings and their relative sizes; such perfect harmony is rarely seen; the only exception being with the main entrance which is so extremely small as to suggest a fortress, and this appearance is increased by the immense plain iron hinge-plates that nearly cover the door. On the lake front, in each of the three stories, is an arched loggia. No one can deny that the effect is eminently satisfactory — when judged simply for the effect — but at the same time it does seem decidedly impracticable in our climate where the thermometer rarely gets above ninety in the hottest weather, while for nearly three months it is liable at most any time to go down to twenty degrees below zero, and with a cutting wind off the lake does not make one long for suggestions of delicious coolness. As for the ornamentation or stone-carving, really, when one looks for it the quantity is small, but it is so grouped together and a few points are so emphasized by it, that the effect is charming. All the details of this cutting are exquisitely fine, yet so deeply are they carved that they produce a most decided impression even when the design cannot be distinguished in all its detail. The roof is covered with unglazed red tile which harmonizes perfectly with the color of the stone of the body of the house, and the large and simple expanse of roof-surface gives a warm effect of color to the building, without which it would appear cold and gray.

The house next on the north is of a grayish granite, with a black slate roof. The stone is rock-faced and in a very decided way shows (as for that matter do all the houses here spoken of) the influence of Mr. Richardson's work. The massive lintels and heavy blocks, especially in the basement wall, give it an air of strength and dignity, but the whole outline of the building and the grouping of the window-openings would seem to show that the exterior did not begin to have its proper share of study, or that the plan was made (probably with the too active assistance of the client) with the very strictest regard for every piece of furniture, and without reference to or thought of the elevation. The windows seem to have little or no idea of arranging themselves into harmonious groups, and most of these openings are unnecessarily large for a dwelling-house. Moreover, their size is accentuated by the frames and sashes being made excessively conspicuous by finishing in natural wood. The roof is too low, and had red slate or tile been used the result would have been much more effective. The one really fine feature of the house is the porch, which is formed by one corner of the building being carried on a heavy granite pier. This entrance is exceedingly dignified and well proportioned, so that with its wide and generous flight of steps it gives a remarkably fine appearance, and thereby relieves and quite alters what would otherwise be a very common-place front. Scarcely any attempt is made at mouldings in the granite. What carving there is on caps, lintels, etc., is of too large a design, and is not deep enough cut into the stone to produce much effect. The stable for this house is very neat and pretty, but, unfortunately, but little seen from the drive.

The next house is built of red sandstone, and is the smallest and least pretentious of the group. The outline of the roof and bay is simple and in good proportion, but, unfortunately, as much cannot be said of the front entrance, which, in a remarkable degree, is a miniature of the one just mentioned; but the process of reducing the size

to fit the house has, at the same time, taken away the very elements that made the former remarkably successful. The entrance way is cramped, the column at the corner becomes insignificant and the stone steps which might have somewhat redeemed the general effect, have a most unfortunate heavy and snake-like stone-railing. There is almost no carving but the tooling-down of the columns, finials, etc., and then putting no carving upon them has not improved these parts, as they now seem to have a very expectant air as if waiting the arrival of a sculptor (as may be the case). The slate roof harmonizes well with the stone, and renders the parts of the house above the first story the finest portion of the composition.

The fourth and last house of the group is of a grayish stone containing much mica, and from the fact that this material continues entirely around the house, leaving no back walls of common brick, it has a dignity and an air of solid worth that none of the others possess. Even its faults seem to be greatly atoned for, and at least in the general pleasure of seeing something that seems honest and true, one scarcely notes the dissonant points. Moreover, with a good, generous porte cochère it does not seem so much like the last two, a merely overgrown cottage, but appears as if the home of people of the world. Almost the only fault with the exterior of the building is the roof, which is simply enormous and, extinguisher-like, entirely overpowers and kills everything else. Moreover, the use of Spanish tile on such an exceedingly steep roof always seems a little questionable. The sky-line is broken by no small dormers, and the impression is at once conveyed that the roof-space is in no wise utilized, and that a vast amount of space has been wasted simply for show. The window-openings are well studied and grouped, and quite a novel feature for a house not on a corner is the main entrance frankly placed at the side, with the doorway opening off an arched recess or vestibule; the steps, landing and arch altogether making an effective feature. The stone not being adapted for carving, quite rightly no attempts have been made in this direction, and band mouldings are simply indicated by rough projecting courses. The stable is by no means on a par with the house, and of such an entirely different character as to cause remark at once and those not of a flattering kind.

When one considers the entire group of buildings as a unit, it is immediately evident that no care or thought was spent in studying the houses with reference to each other. Of course, this is sometimes a difficult thing to do, but in this case most of the houses were commenced at about the same time, and with very little trouble, at least the general outline and colors of stone and roof might have been known and taken into consideration, yet, very evidently nothing of the kind was done, but each party built to suit his own imperial pleasure and trusted to luck for harmony of surroundings. As a matter of course many things are inharmonious — for which there really was no need — except possibly the pride of the architects who were averse to consulting with any of their professional brethren for fear it might look to their clients as if they themselves did not know all that is to be known.

THE MANUFACTURING USES OF EGGS.[1]

EGGS, their dietetic use apart, are of great utility in many branches of industry. In some, as in confectionery, both the whites and yolks are used, but usually the two find separate applications. The whites are employed in calico-printing, in photography, in gilding, in clarifying wines and liquors, and by the book-binder on the leather previous to lettering or tooling.

It will thus be seen that there is a heavy drain on eggs for various manufacturing purposes. Many millions are used in France for clarifying wines. By this means a wholesome and nourishing article of food is taken away from public consumption and its price considerably enhanced. The clarifying of wines in France requires annually (at the rate of four eggs per barrel) more than 80,000,000 of eggs. Bordeaux alone uses 15,000,000 for this purpose and Paris 5,000,000. To avoid this, certain kinds of fining powders are now beginning to be employed, by which wines may be clarified with equal facility and at a smaller expense, and these are sold to the extent of about £8,000. Photographers consume a great quantity of eggs, and egg albumen is used for other purposes.

Egg Albumen. — The preparation of photographic paper with salted albumen has become in many hands a large business of itself. Some idea of the quantity used may be found in the statement that in one establishment alone upwards of 2,000,000 eggs have been employed in the course of six months to furnish the requisite quantity of albumen. In calico-printing, for fixing certain colors, Alsace uses about 330,000 pounds a year, representing 37,500,000 eggs, or the product of 250,000 hens.

The Bohemian and Moravian albumen houses have, besides the places where they carry on their manufacture, establishments in many other towns where eggs are broken daily and the yolks retailed for kitchen purposes. In this way the very best price is obtained for the yolks, which are turned to good account. The white of the eggs is collected and transported to the required manufactory for further use. As fresh eggs can only be procured in spring and summer, albumen manufacturers who wish to make during the year must lay in stores of eggs. To preserve these stores from injury, the following process is necessary: The eggs are packed in wicker baskets, bricked up in pits, which are filled in with lime water. These pits are covered with planks and protected in winter from the frost by heaps of straw and manure. In this way the eggs are kept fresh and uninjured for the object in view.

The high price of egg albumen and the evils attending its use led, soon after its introduction, to an effort to replace it by a cheaper and more suitable medium, and many materials have been experimentally tried for this purpose, but hitherto without superseding the use of egg albumen. Animal caseine and vegetable gluten were at first principally recommended as a successful substitute for albumen, but these two bodies and many other proposed substitutes have failed to prove their durability. They even lack the properties peculiar to albumen alone, and essential to their employment as thickening mediums. Thirty years ago the Industrial Society of Mulhouse offered a prize of £400 for the discovery of a material or process for replacing albumen in this respect in calico-printing, but hitherto no one has been found to whom this prize could be awarded. Z. Leuchs, of Nuremberg, proposed, indeed, to utilize the immense quantities of roes of fishes caught in Norway and Sweden, which contain a considerable percentage of animal albumen. His proposal, however, met only with a *succes d'estime*, for A. Dollfus, who went to Norway at the instance of the Society to make experiments on the spot, as to how far these roes could be employed for the manufacture of albumen, gave it as his opinion that this preparation could not be practically carried out, as the albumen obtained was totally unfit for printing purposes. It resulted, in spite of numerous experiments, in the impossibility of preparing albumen free from the skin-like egg-shells of the spawn. Leuchs was, indeed, rewarded for his idea with the Society's gold medal, but the high prize remains still to be awarded.

The yolks of eggs are in great demand for dressing the skins in glove-making and calf-kid leather. Messrs. Dent, at Worcester, use up a large quantity.

According to M. A. Mosselman, yolk of egg may be preserved for some time without losing its clearness or color, and without acquiring any smell, by adding to it five per cent of neutral sulphate of soda, either in a powder or concentrated solution. At his establishment at Carentan (Manche) France, M. Mosselman prepares a preserved mucilage for the use of leather dressers, skin dyers and others; it is limpid, of a fine color, and has no odor. It was awarded a silver medal by the Society of Industry of Mulhouse some thirty years ago.

An albumen manufacturer in Krakau, Austria, sells yolk solid at 8d. per pound and received for this a prize medal at the Vienna Exhibition in 1872.

An egg oil is obtained in Russia in large quantities and of various qualities; the best so fine as to far excel olive oil for cooking purposes. The less pure and very yellow qualities are chiefly used in the manufacture of the celebrated Kazan soap. Both of these products were shown at the London International Exhibition in 1862 and at subsequent exhibitions. Neither the oil for cooking purposes nor the soap are sufficiently cheap for general use; they are consumed only by the wealthy classes as luxuries, the soap, being regarded chiefly in the light of a cosmetic, is a much-valued addition to a Russian lady's toilet necessaries.

The yolk is also used for medicinal purposes. It was used in the Middle Ages for the painter's art before the discovery of oil colors, as in the Chapter-house at Westminster.

[1] From a paper by P. L. Simmonds, F. L. S., read before the Society of Arts, December 7, 1887.

ELECTRIC RAILROADS IN THIS COUNTRY. — The *Electric Age*, in its forthcoming issue, will say: "Contrary to the general impression that there is only an electric railroad here and there, an examination of electrical-railroad statistics shows that there are already 130 miles of road in operation on this continent. Of this number, 21 miles are in operation in Pennsylvania, 16 miles in New York, 10 miles in Ohio, and 83 miles in New Jersey, Maryland, Colorado, Michigan, Missouri, California, Alabama, Virginia, Kansas; Delaware, Rhode Island, and Ontario combined. Almost all of this building has been done in the past year. There are in course of construction, or contracted for, 150 additional miles in the States of New York, Massachusetts, Connecticut, Tennessee, Ohio, California, Pennsylvania, Nebraska, Kentucky, and Minnesota. On these various roads, constructed and constructing, in 62 different towns and cities, the Van Doepoele system is used, or to be used in 17 cases, the Daft system in 15 cases, the Sprague system in 7 cases, and the Bentley-Knight, the Heart, the Henry, the Julien, and other systems in the remaining cases. The last-named system is to be used on the projected New York and Harlem Fourth Avenue Electrical Railroad, while the Daft system is in use at Los Angeles, where the first electrical railroad was opened for business in the winter of 1886-7."

ILLUSTRATIONS

[*Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.*]

HOUSE ON HEREFORD STREET, BOSTON, MASS. MESSRS. SHAW & HUNNEWELL, ARCHITECTS, BOSTON, MASS.

[Helio-chrome, issued only with the Imperial Edition.]

GOTHIC SPIRES AND TOWERS. PLATES 13, 14 AND 15, ST. PETER'S, KETTERING; ST. ANDREW'S, BACKWELL; ST. MARY THE VIRGIN, FAIRFORD; ST. FUNBARRAS, FOWEY; ST. PROBUS AND ST. GRACE, PROBUS, ENGLAND.

[Issued only with the Imperial Edition.]

COMPETITIVE DESIGN FOR THE INDIANA SOLDIERS' AND SAILORS' MONUMENT. MR. S. S. BEMAN, ARCHITECT, CHICAGO, ILL.

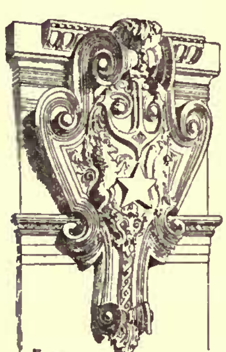
COMPETITIVE DESIGN FOR THE INDIANA SOLDIERS' AND SAILORS' MONUMENT. MESSRS. WAITT & CUTTER, ARCHITECTS, BOSTON, MASS.

COMPETITIVE DESIGN FOR THE INDIANA SOLDIERS' AND SAILORS' MONUMENT. MR. GLENN BROWN, ARCHITECT, WASHINGTON, D. C.

HOUSE AT MORRISTOWN, N. J. MR. BRUCE PRICE, ARCHITECT, NEW YORK, N. Y.

LUTHERAN CHURCH, LOS ANGELES, CAL. MR. ERNEST A. COXHEAD, ARCHITECT, LOS ANGELES, CAL.

THE OLD AND THE NEW.



From La Construction Moderne

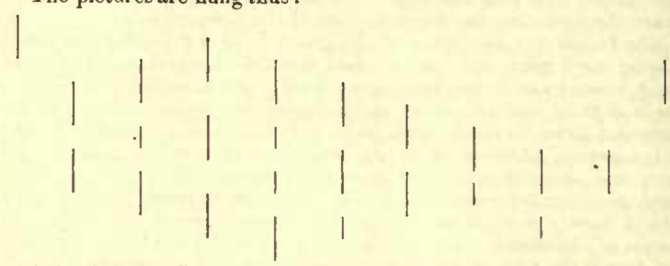
It is a pity that the "Old" Water-Color Society has given place to the "Royal" Society, for the former title is far more appropriate to the contents of the gallery. If a Rip Van Winkle took a walk round the rooms, he would find the same subjects on the walls, the same names in the catalogue, the same intense respectability as — I was going to say, fifty — I certainly can say truly five and twenty years ago. Sir John Gilbert, Mr. Birket Foster, Mr. Carl Haag, Mr. Frederick Taylor and many more, continue to turn out pictures no better, no worse (or very little worse) than they did years and years ago. And how comes it that they see nothing new in Nature? Mr. Haag, for instance; does he trip off to Cairo every year? And if so, how comes it that he always sees life there under exactly the same conditions and with exactly the same effects? Why, too, is Sir John Gilbert eternally giving us "After the Battle?" One wearies of the Pall Mall conventionalities and one longs to find Miss Montalba painting the North Pole, Mrs. Allingham the Highlands and Mr. Richardson anything but the Italian Lakes.

Still, even novelty has its drawbacks and such innovations as the works of Messrs. Emslie and Henshall — the one a stupidly vulgar pun illustration, "Shakespeare or Bacon," and the other, an equally stupid and far more vulgar series of four pictures, called "Married"— are less to be desired in the rooms of a highly respectable society of painters than they would be even in the pages of the *Graphic*. Mr. Henshall knows the British public, for he carefully "reserves his copyright." Wise man! his pictures will doubtless be immortalized as Christmas chromos.

But it must not be thought that the exhibition is void of interest; it would be worth a visit if only to see the work of one of its newest associates, Mr. Arthur Melville, whose "Snake Charmers" and "Waiting an Audience with the Pasha," are excellent studies of color and draughtsmanship. Firmly drawn and solidly painted, these pictures form a fine contrast to Mr. Haag's questionable Eastern effects and Mr. Holman Hunt's "Sleeping City." The latter is intended to be a study of sunlight, but it is only a *mêlée* of yellows, reds and purples.

If the Water-Color Society's Exhibition is a mass of conventionality, the same charge cannot be brought against Mr. Menpes's Japanese drawings and sketches. Entering from the damp dinginess of Bond Street, one finds oneself in a room, the very air of which has a peculiar concentrated Japanese odor of some indescribable something. The walls are hung with a sort of mauve or peach-blossom colored drapery; the floor is covered with some queer, rough buff material, and the only couch is of the same color. A Japanese girl sells catalogues seated upon, not a Japanese seat, *i. e.*, the floor, but upon a very English cane chair. This is so out of harmony with the surroundings that we wonder it escaped the notice of the decorator, for even the visitors on the private view day put themselves into "harmonies" to suit the pictures, Mrs. Oscar Wilde, we are gravely told, wearing a dress and hat trimmed with almond blossoms, made expressly for the show.

The pictures are hung thus: —



and the frames (Japanese) are narrow beads with wide mounts of several tones of gold and silver. This is meant to enhance the beauty of the sketches — in reality, it destroys them. The pictures are not placed in the centre of the frame — a common practice in France, though new to London. Mr. Menpes's work is essentially impressionist, and, inasmuch as the pictures are very small, herein lies his mistake. A picture ought to look well on a wall when one is sitting some distance off, but these sketches appear, at two yards' distance, to be a series of gold mounts with a spot or two of weak color dropped onto them. Granted that a picture should merely be a few strokes of color when one looks into it, I imagine it ought to fall into some shape at a sufficient distance. This is the case with the merest smudges of Manet, Besnard, Raffaëlli and their friends, but Mr. Menpes's sketches are only, at a little distance, impressions of impressions, and his system of sticking a drawing up here and there, all alone and out of sight, prevents one studying it as one would wish to do.

The catalogue resembles the "analytical books of the concert," giving notes and descriptions of the works. Here are a few examples: "'Three Little Maids from School,' three dancing girls, etc.; they always color their lips an intense red or dark bronze [one need not go to Japan to see colored lips]; 'A Tea Sale,' tea is being sold at the shop, which is adorned with red and white lanterns; 'Evening after Rain,' the sun is setting; 'A Street,' a comparatively quiet street; 'A Blonde Day,' this might almost be a Greek street, and Greek girls walking in it; 'The Scarlet Umbrella,' a market-place with umbrellas; 'Chums,' there is something very Greek about the bearing of Japanese children.'" Where Mr. Menpes sees a Greek character about the Japanese one is at a loss to discover. Surely nothing can be so unlike as the graceful down-flowing drapery of a Greek marble and the tightly-bound round garments of a Japanese girl. The legs of Greek women were free to move; those of a Japanese are bound together so tightly that she is only able to shuffle.

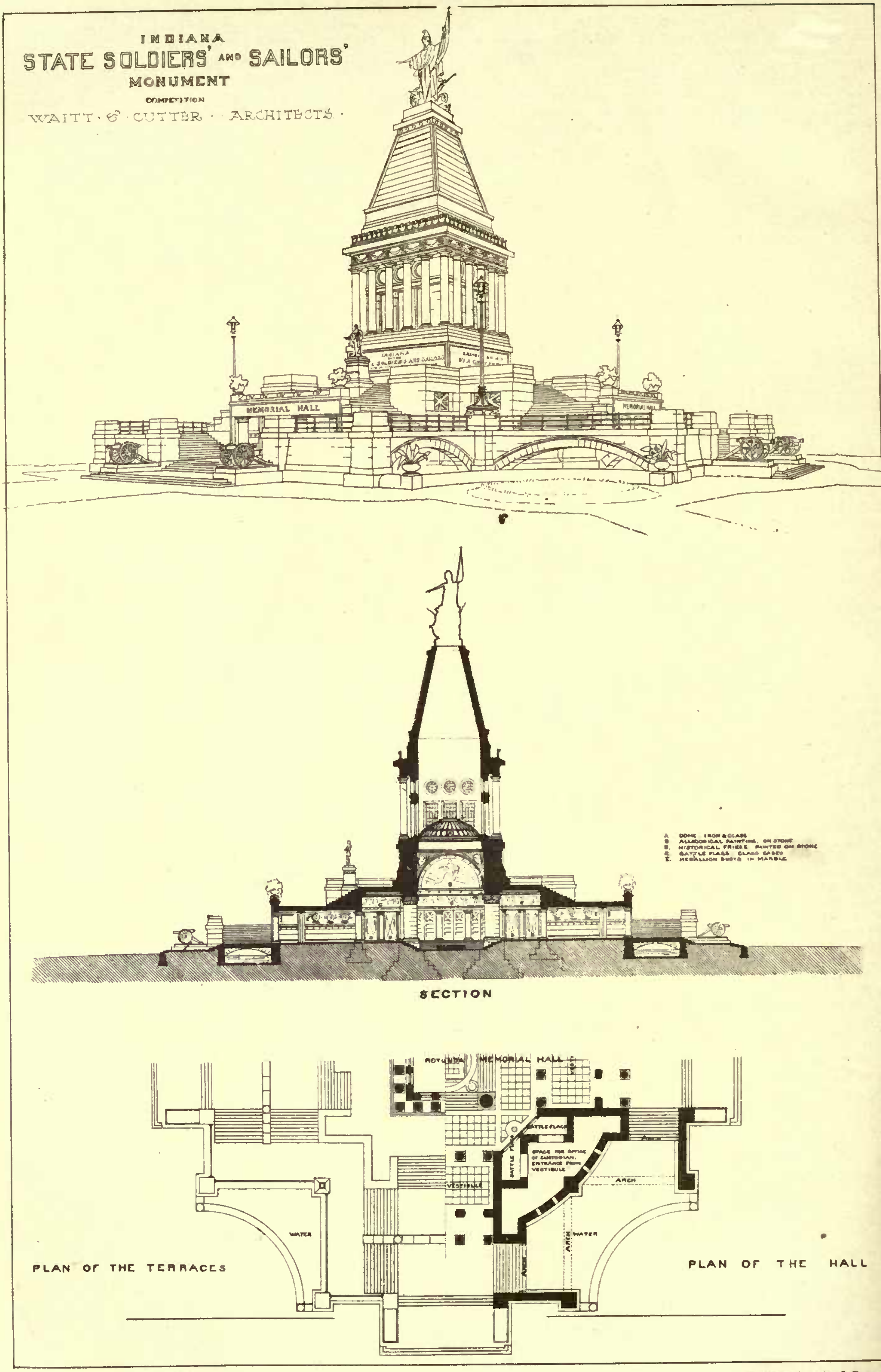
But when one has got over all these affectations, when one's eyes are clear of the dust that Mr. Menpes tries to throw into them, when one has got over the disappointment entailed by discovering that the artist has looked at Japan through native spectacles instead of with his own European eyes — then there is much to enjoy in his work. It is fresh and crisp and true in a sense — wanting, perhaps in light and air and certainly in color, for Mr. Menpes is no colorist. There are plenty of colors, but no color — as the French say, "*beaucoup colorié, mais pas de couleur.*" Japan cannot be as gray as this and why should shadows under a hot sun be so much less strong in Japan than elsewhere? Compare light and shade as painted by De Nittis or Montenard with these sketches. A charming little picture described by Mr. Menpes as "Here we have the Vivid Pictures, etc.," is to my eyes a harmonious mass of grays. Some of the little scraps of tea-gardens and streets are delicious in tone, and the way in which the painter jots in his figures is most clever. Let me commend the garments of the "Misses Pink, Lilac-Blossom, Crocus and Lavender," but the same praise cannot be bestowed upon the 'Lemon Bridge.' The blue of the water becomes intense as the afternoon wears on." The blue of the paint, perhaps, but no one would dream of its being meant for water, except from the fact that a bridge is above it.

Surely Mr. Menpes cannot be serious when he speaks of his etchings. "Every proof is printed by myself. I am convinced that the etcher, and the etcher alone, can bring to the delicate process of printing the necessary tenderness and sympathy of workmanship which gave, in a less busy and a less mechanical age an artistic individuality to each proof." That the "artistic individuality" may have been apparent in the etchings of former days, those happy, idle, unmechanical ages long since past, is possible, but in spite of the artist's "sympathy of workmanship," I fail to see much "tenderness" in these specimens of his "delicate printing."

In an adjoining room are several so-called pictures by Mr. William Stoll, of Oldham. Never let it be forgotten that this particular Mr. William Stoll, this Stoll of the great family of Stolls, is of Oldham. So he signs his works, and posterity will be thankful.

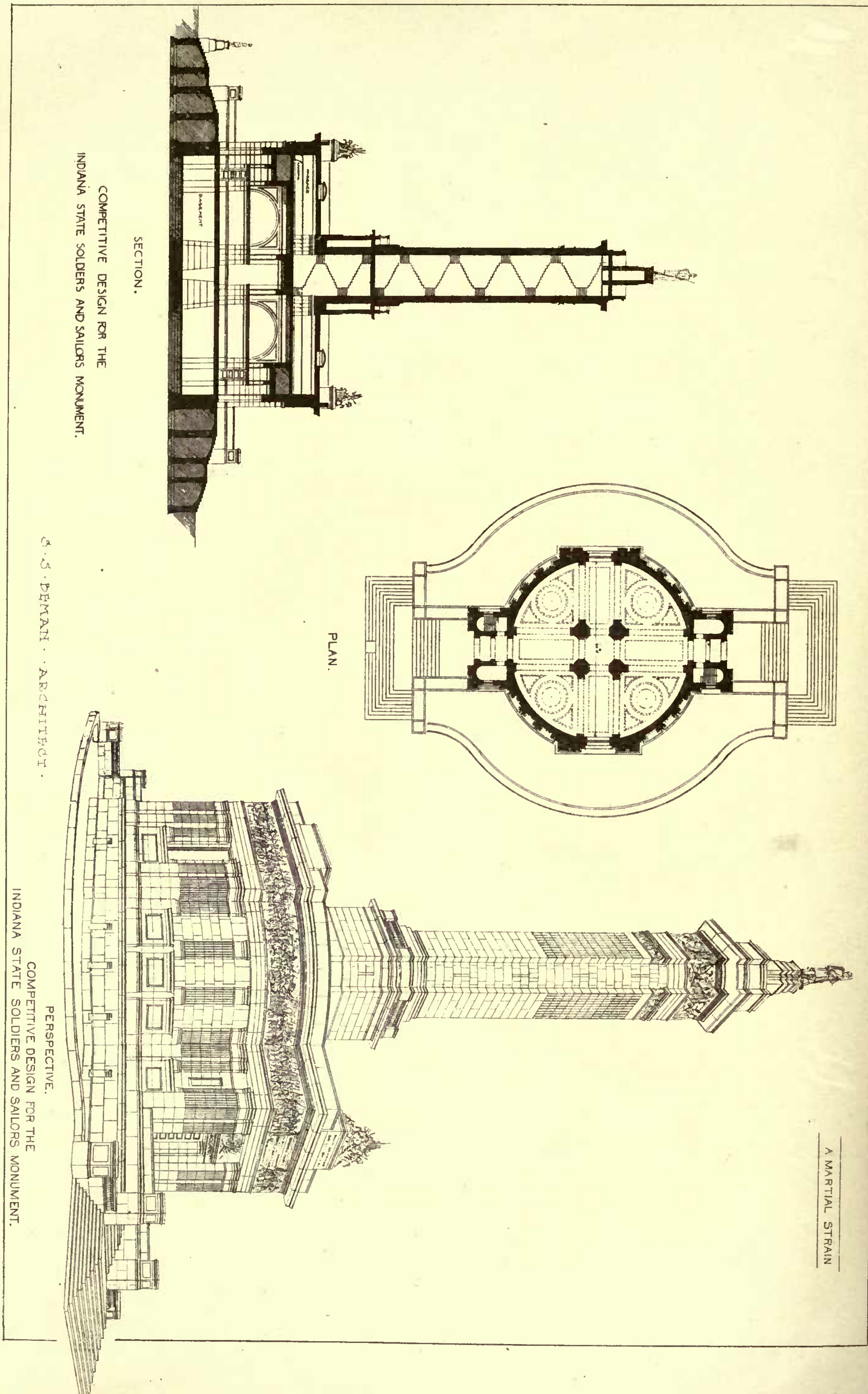
PENGUIN.

COPYRIGHT 1888 BY TICKNOR & Co



Heliotype Printing Co. Boston

COPYRIGHT 1888 BY TICKNOR & Co



Heliotype Printing Co. Boston.

American Architect an

COPYRIGHT 18

RESIDENCE — MORRISTOWN. N.J.
·BRUCE · PRICE · ARCH'T ·

ICKNOR & Co

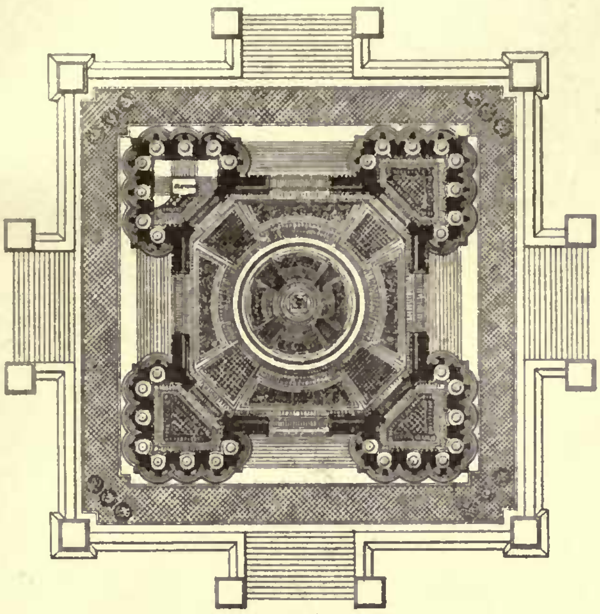
Heliotype Printing Co. Boston.

COPYRIGHT 1888 BY TICKNOR & CO.

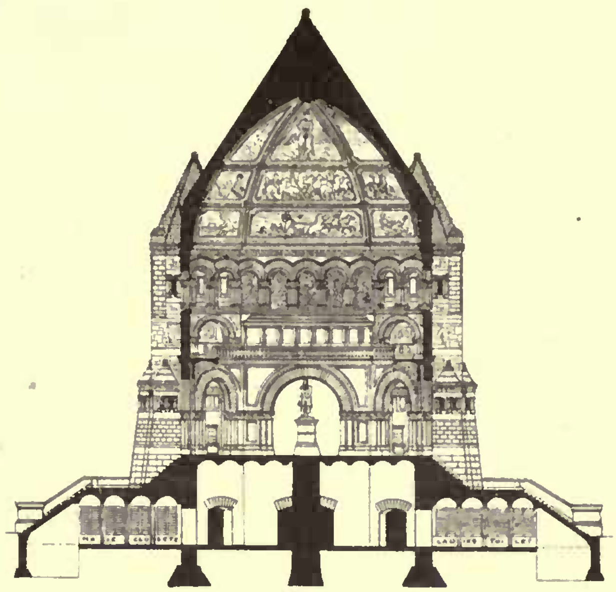
+ Lutheran + Church + at + Los Angeles +

Heliotype Printing Co. Boston.

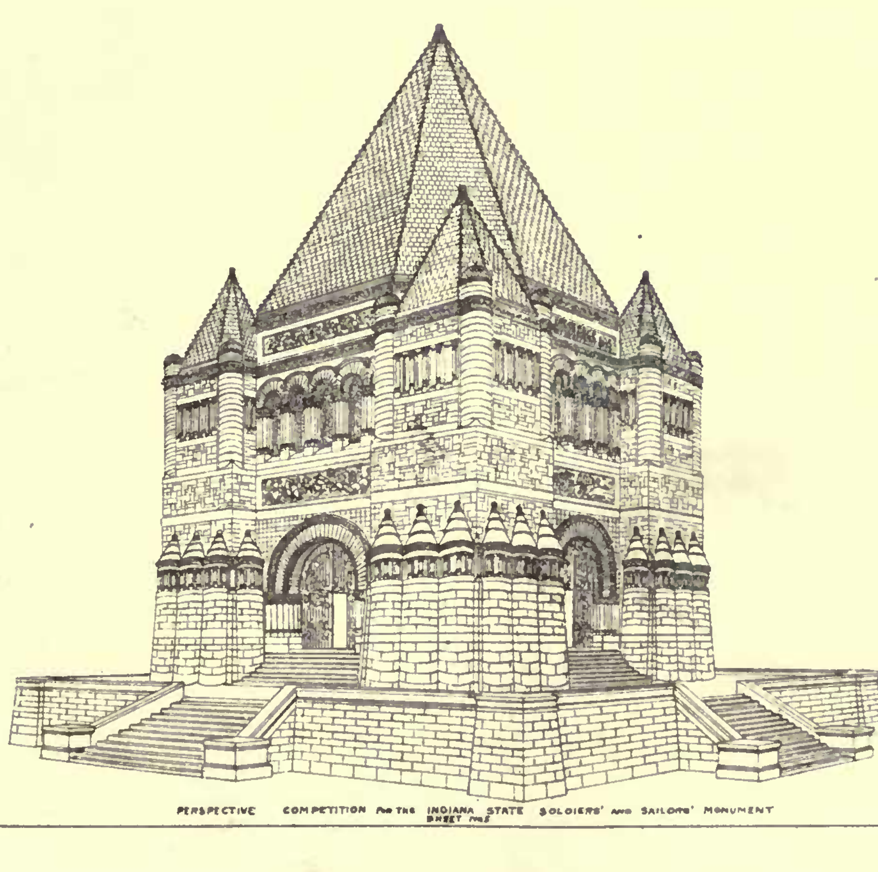
COPYRIGHT 1888 BY TICKNOR & Co



PLAN
COMPETITION FOR THE INDIANA
STATE SOLDIERS' AND SAILORS'
MONUMENT



SECTION
COMPETITION FOR THE INDIANA
STATE SOLDIERS' AND SAILORS'
MONUMENT
SHEET No 4

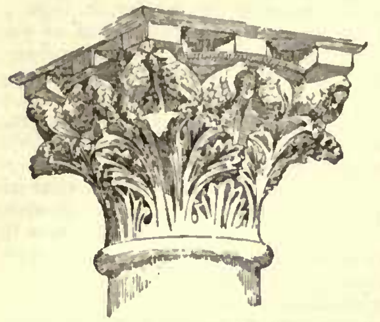


PERSPECTIVE COMPETITION FOR THE INDIANA STATE SOLDIERS' AND SAILORS' MONUMENT
SHEET No 5

Glenn Brown
archts
607 La Ave
Washing DC

Heliotype Printing Co. Boston.

JOTTINGS ABOUT THE UNITED STATES.



A YOUNG Englishman sends the following report to the Architectural Association:

Since writing my last lot of "Jottings about Paris," there has been time enough to do much and to travel far, and that is about what I have done, having travelled over seven thousand miles. On the 30th of August, about 4 P. M., I stepped off the tender and on the good ship "*Bothnia*," which was to be my home for more than a week. We started about 6 P. M. in a drenching rain and stopped at Queenstown next day. Weather decidedly nasty, and I, with most of the other people, did not feel like making a hearty meal. It is a great joke at Queenstown to see the way the natives — mostly girls — surround the steamer in all sorts of boats, and scramble or get hauled up the side to sell their bog-oak sticks and ornaments, laces, fruit, etc. And still more funny to see the scurry to depart when the screw starts and the ship begins to carry them towards their much-loved America. Their task in escaping is not rendered more easy by the action of the crew, who energetically — very — help them over the sides as soon as the ship begins to move. Next day I was well and *how* hungry, and I had thenceforward what the Yankees call a "real good time" until we reached Boston on the night of Friday, September 9th. And this, despite the discomfort of a week's bad weather from the time we started — bad enough to make us a day and a half late in arriving. The last three or four days were, however, splendid, and life *is* worth living on a good steamer in fine weather, I can assure you.

We had to wait outside Boston Harbor for the next morning's tide, and finally got landed at the pier, passed the Customs officers, and away to hotel soon after 10 A. M. I spent a week in Boston. The old part of the town is very irregular, but has some remarkably fine buildings. The streets, however, and also the footpaths — or sidewalks, as they are called — are most vilely paved, and are very dirty if the weather is at all wet, which it was several days whilst I was there. This remark as to paving applies to most of the towns I have visited, New York being as bad as any. The Yanks are very fond of telling us where we are behind, but I think in this matter we can show them a very good lead. And what makes the matter worse is that nearly every street has car-tracks in it, the rails of which are not almost flush, like the ones we use, but many are just like a railway line, and so have a deep rut each side of the iron. Others are flush one side, but the grooved rail we use does not seem to be used anywhere here. One reason for this is that the heavy snow and severe frost chokes them up, I am told. In fact, this question of the weather enters very largely indeed into all matters here. It partially accounts for the wretched state of the paving, I am assured, as after several moist days, the mercury suddenly drops a few points below zero, and you can guess the effect on anything that can be moved or lifted by frost. Wood and asphalt have been tried, I believe, but the ordinary granite paving has had again to be resorted to on account of the ease with which it can be repaired. If the streets *were* carefully repaired, well and good, but it seems to me they are not.

The climate naturally affects the arrangement of the buildings, and here the States certainly are far in advance of us. Houses, blocks of offices, and buildings of all kinds, have all the halls and corridors heated, either by hot air from furnaces in the basement, or by coils of steam-pipe, this steam being supplied in New York by a company, and laid on to the houses and offices just like gas or water. My office here, like a good many others, is warmed in this way; there is no mess and bother in keeping a fire going, but a nice temperature which I can regulate to please myself. And if I go out into the corridor, I do not get my nose nearly bitten off, or if some one opens the door I am not nearly blown off my chair — both for the simple reason that the hall and corridors are about the same temperature as the rooms opening on them. Attend to this, ye builders of houses, where draughts are the principal feature!

Another point for our architects. All the rooms in the houses here, with scarcely an exception, have one or more large closets to them — planned with the house — and no one who has ever felt the advantage of this would cease to bully and condemn our — usually — cupboardless houses. For instance, if the room is a fairly large one, it has two closets, one of which contains the toilet requisites and the other one's wardrobe. You fit up your room as a sitting-room and have a bed which folds up and looks exactly like a sideboard, your chest of drawers and dressing-table combined having a marble top and large mirror, which can be nicely hung with scarfs or little curtains, whilst knick-knacks can be artistically distributed over the said marble top and also on the mantel shelf, and there you have, until such time as you retire, quite a drawing-room.

A very objectionable, but very common feature here, however, is to make the house deeper from back to front, and put another room in the centre, approached and connected by sliding glass doors with either the front or back room, through which it gets its only light and air. The great majority of the people here do not keep a house of their own, but live in boarding-houses, and this unhealthy arrangement gives an extra room for letting on each floor, you see, which helps the proprietor or proprietress to pay the enormous rental of the house. Flats, too, are very numerous.

But somebody will be asking, What has all this general description to do with architecture? or even with the "allied arts"? Not much, perhaps — that is, with architecture as a fine art — but this will also be the case, I fear, with all I may write. Nevertheless, some practical hints may be gathered from what, after all, are merely the jotted down *impressions* of a roamer in this land of dollars. To return, therefore, to Boston. The first thing that strikes one is the enormous quantity of marble used — almost always white — whole outsides of large buildings being of it, as well as the steps and stairs, floors, balustrades, dados, and wall-linings, often the ceilings — in iron frames — etc. Marble, marble everywhere in fact. The outsides of good buildings, if not of marble, are of granite, a very fine-grained sort, of a nice light gray color. The buildings are more striking from their size, evident importance, and the equally evident lavish expenditure on them, than for their artistic merit. They are usually the storied arrangements of the orders and the stuck-on-looking column and pilaster arrangement, of which one has seen so much and got so tired.

I need hardly say that this does not apply to the works of the late Mr. H. H. Richardson, of which Boston and its neighborhood contain some fine examples, the chief being his Trinity Church, which has cost £125,000. Illustrations of this and other works were exhibited in the R. I. B. A. room when Mr. Richardson was elected a Corresponding Member. He died, I believe, before the notification of this election reached him. Other works of his I noticed were a corner shop, with offices over, in the town (disgracefully disfigured, by the way, with hideous sign-boards), and the Law School, forming part of Harvard College at Cambridge. Some friends, whose acquaintance I made on the steamer, and who exhibited, in a marked degree, that hospitality for which our American cousins are famous, one day drove me to the residence of the late Mr. Richardson, at Brookline, and introduced me to one of the firm now carrying on the business, Mr. Coolidge, who most courteously showed us through the offices attached to the house and into his late patron's study — a charming room with *such* books carefully stacked around it — something to make a student's mouth water. The office is divided up into a number of "pens," so that each pupil or assistant has, so to speak, a room to himself, and he is held responsible for the good order of everything in it, and is, when therein, monarch of all he surveys. These "pens" are, of course, arranged along the walls, each having a window, and a central corridor runs down the room between them.

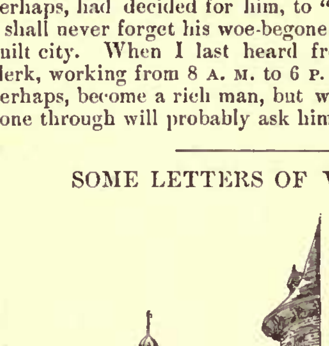
Other buildings in Boston worthy of note are the Post-office, City-hall, and some fine "blocks" erected by different insurance and other corporations. Also, the Vendome and other hotels, and many private residences on or near Commonwealth Avenue. This splendid street runs right through the new and fashionable part of the town, which the sea used to cover, and is two hundred and fifty feet wide, with a continuous park a mile and a half long in its centre. . . .

Let us, however, get on to Chicago. What a marvellous place that is! Think of it. Forty years ago there was only a small Indian trading-post on the plain where now stands a vast city. In 1843 the population was but 7,000. In 1850 it had grown to 29,000, and in 1860 to 110,000, whilst now the population is something like 500,000. And this, despite the great fire of October, 1871, which destroyed practically the whole of the business part of the town, and involved a loss of some $200,000,000 or £40,000,000. One of its leading papers, speaking of the wonderfully rapid reconstruction of the city, said: "We know no words which will better convey to persons outside Chicago an idea of what has been done by way of rebuilding the city than to say that, beginning on April 15th and ending December 1st, 1872, excluding Sundays, counting two hundred working days of eight hours each, there will be completed one brick, stone or iron building twenty-five feet front, and from four to six stories high, for *each hour of that time.* The extraordinary achievement in rebuilding Chicago is not confined to the number of new buildings, but applies equally to their size and superiority in construction and materials." And so it does. I have seen nowhere, either in this or our own country, or on the Continent, such a truly noble lot of buildings as Chicago possesses, and buildings at the same time so original in treatment. There is an almost total lack of the conventional stuck-on-looking column and pilaster treatment. There they stand, what you see carrying them, with little ornament, but that little good, a credit to their designers and constructors, and to the enterprising citizens who laid out their money in allowing these "to design in beauty" and massiveness and "to build in truth." I have made a collection of photographs, which I will try to find time to arrange and send our Secretaries, so that if they can manage to exhibit them in our rooms, readers (if there be any) of these jottings may see for themselves whether my delight is strained. Don't forget to count up the stories in the buildings so as to get *some* idea of their size. I say "some" because without seeing them I doubt very much if any one could realize how large they are, and hence, even the photos give a somewhat poor idea of what I am talking about.

After spending some time in Chicago, I went to Kansas City, a quite new and quickly-growing town some five hundred miles to the southwest of the first-named. Starting at mid-day, the express lands you in Kansas City at nine the next morning. As you feel after taking the first mouthful of a tough steak — that you don't want any more of it — so I feel with regard to Kansas City and the "Wild West." It rained almost incessantly the first two days I was there, and the mud was knee deep. The natives wear boots up to their thighs, but I was not so provided, and suffered accordingly. The whole town is on clay, on the banks of the wide, but dirty-looking Missouri. Missouri mud, in fact, is becoming proverbial. Kansas City has been laid out and so quickly built that no time was left for "grading" the roads. Consequently, as the site is very hilly, while standing at a four cross ways, you can see in each direction the cable-cars (no others could mount some of the hills) bobbing up and down just like the cars on the switch-back railway at the late Exhibition. On my return journey I went to the railway-station—depôt they say here — on a cable-car, and the descent was so steep that, as I was facing the way we were going, it was only by holding on with my hands that I was able to keep my seat, and even then we were landed on a high wooden viaduct, the street, on which stood the station, being several flights of stairs below. "Grading" has now been commenced on several of the streets. Rather nice to have your house left some twenty feet above the road, eh? I saw several thus left. Only the few principal streets are paved, the paving being of wood blocks more or less round — small trees simply sawn through in chunks about three or four inches thick. In the other streets, carts, etc., sink their wheels to the axles, and people on foot can only cross just here and there where plank walks are laid from side to side. Planks, too, form the walkable portion—where they are walkable—of most of the sidewalks.

There are some very fine buildings going up in the town, mostly the work of Chicago or Eastern architects. The local men do not apparently inspire confidence, or else it is known that they lack the talent. You see any number of cowboys — just off their ranches for holiday or business — not the neat and clean-looking articles of Mr. Cody's show, but the real thing. Tall, well-built, splendid specimens of humanity, brown as a berry, and looking very picturesque in their wide-brimmed buff-felt hats and high boots, generally covered with mud to the knees. These Western cities may be the places, as a large hotel proprietor expressed it, to "pile up the scheckels," but after London, Paris, and, as far as I know, New York also, there is a roughness and want of niceness and politeness about the place and people that jars very considerably on a — more or less — civilized person. One object, and one only, seems to rule — to make money. For my part, I would rather make less and stay in the East. On the cars — that is American for "in the train" — going to Kansas City I got intimate with a young fellow who had just left Harvard College, every inch a gentleman. He had decided, or his friends, perhaps, had decided for him, to "go West" and make a fortune. I shall never forget his woe-begone looks as we went round the half-built city. When I last heard from him he was a booking-office clerk, working from 8 A. M. to 6 P. M., Sundays included. He will, perhaps, become a rich man, but when he looks back at what he has gone through will probably ask himself, Is it worth it? C. H. B.

SOME LETTERS OF VIOLLET-LE-DUC'S.[1]



Castle- Oydonck near Ghent

M. VIOLLET-LE-DUC *fils* intends shortly to publish the voluminous correspondence of his father, from 1835 to the year of his death, which will include letters written by their author while abroad, often illustrated with sketches, grave or grotesque, hit off on the spur of the moment. The work will, doubtless, possess a value and charm of its own both from a biographical and artistic point of view. Since I met the editor in Paris, he has greatly favored me by placing at my disposal six of the forthcoming letters, two of which, from their brevity and worth, I will trespass for a few moments longer on your time by reading. The first is dated August 23, 1869, and is addressed to M. Paul Bœswillwald, then a young architect completing his studies in Italy. I think it will be admitted that no sounder advice in so few words could be given to a student: —

"*Mon jeune Confrère et Ami*, — I received your letter from Florence yesterday, and I thank you for all the details it gives of your travels and of your impressions as an artist. One ought to view objects without prepossessions, and without disturbing influences: that is the essential point; and I perceive that you have examined matters so as to turn everything to good account. The Greek art is certainly the only architecture which leaves an impression free from all extraneous elements. Since, however, you are passing the winter in Rome, notice well the edifices of the Empire, not as an artist, but as an engineer, as a practical man, and you will observe how comprehensive is the plan of these monuments, how it was possible to raise them rapidly and with simple means. The Romans, who are represented as ostentatious to excess, in the books written by literary archæologists, were the most economical of all builders; but this economy is very intelligent, and never descends to meanness. If at Rome you have the courage to disregard the Roman decoration — which, in spite of its richness, is not worth much — in order to occupy yourself with the mechanism of the Roman structure, in order to examine how it was possible to obtain so great results with such simple and inexpensive means, your time will be well spent. At Rome we see such a multitude of things, and many of them so interesting, that we are everywhere easily tempted to appropriate, to make numberless notes and sketches, without due connection and without a dominating idea. When you return home you will perceive that all that is useless, and that labor concentrated on one of the dozen subjects you have glanced at would have been of great interest and real value. Therefore, my dear friend, see a little of everything, but try to utilize your stay in the great city of the dead by extracting something from it definite and limited. Above all, beware of the influence of the manner of living and studying adopted at the Villa Medici. It is seductive and very pleasant, renders all work easy and agreeable, but when the cheerful days of comradeship have passed away, and one faces the reality, one sees that there is very little left at the bottom of the bag. Endeavor to draw from your own resources a subject to treat of there, and, devoting yourself to this object, whatever it may be, do not allow yourself to be diverted from it. I know by experience that this is difficult, for at Rome one is like a man with a good appetite in presence of twenty tempting dishes; he would much like to eat them all, but, not being able to do so, he tastes them one after the other, and he finds at last that he has not dined.

"I perceive that you have taken a rapid run over the environs of Rome, where there are, in fact, more objects of interest than in the city itself, where this age of ostentation has done so much to spoil everything. You must well observe the small towns of the district, and Viterbo, Civita Castellane and Villetri. There are many striking things to be found there of the mediæval period, still uninjured. You must visit the outskirts of Rome, so full of interesting ruins; and the winter is favorable for these excursions. But what is really worth studying well is the Roman structure, and that has never been methodically done. You must begin with the Republic and Etruria, and the monuments of Magna Græcia, and follow them down to the Empire. You will find there a mine of curious and practical observations of veritable interest.

"I thank you sincerely, my friend, for your kind remembrance and the compliments you have sent me with regard to the *cordon rouge*. [M. Viollet-le-Duc had just been made a Commander of the Legion of Honor.] If you think you will require any information, do not fail to ask me for it. — *Tout à vous.*"

The second letter is written in quite another key, by a man who was one of the last to wear his heart upon his sleeve, but here we find it laid bare in sorrow for his country and in the warmth of his friendships. It bears date February 23, 1871, and is addressed to M. Révoil, author of "*l'Histoire de l'Architecture Romane dans le midi de la France*":

"*Pour moi, mon cher ami*, I have met with no casualty during my days and nights before the enemy, but unfortunately, I have seen many of my brave comrades fall around me. My son has also escaped injury, but his child has died, like so many others, from privations which have been imposed upon us all. I pity you sincerely, my dear friend, and there is no consolation to offer you. [M. Révoil had just lost his wife.] It is not in middle life that one meets again with unalloyed affection, if one has had the good fortune to find it — a rare thing. We must give ourselves up, however, to our now so afflicted country, and no one has a right to withdraw himself from the duties it imposes on him, whatever his family afflictions may be. We must all be convinced of this if we wish that our France should rise again; no personal feelings should make any one become a defaulter.

"We are still shut in here, not being able to communicate with those outside without the permission of *ces Messieurs*. As for me, I keep to my post. We have had a hard time of it; but the population of Paris has risen above all I dared hoped. Ah! if we had had some military chiefs! But of what use are these regrets? We must restore our country, cost what it may; and it is necessary that all good citizens should rigorously set to work. Gasnier has taken refuge at my house, his residence at Suresnes being in the hands of the enemy. He has been there since the investment. Many of our friends are I know not where; several left Paris before the siege; of others I know nothing. Many artists have been killed, for in this war it is principally men of intelligence who have devoted themselves to the good cause; the noisy, base and cowardly *canaille* have lost credit in the minds of those simpletons who used to call them — the People. Let us hope that we shall gain a little experience and profit by this grievous lesson. Let us hope that we shall begin to reflect, to know how to conduct ourselves, and to disregard bad and incapable men; but what a work there still remains to do!

[1] From a paper by Charles Wethered, M. R. C. S., read before the Royal Institute of British Architects.

"Leaving Paris on the 18th of September, with my auxiliary corps of engineers, I did not enter it till the 27th of January. Wounded in mind and bleeding in heart, I set to work to forget, if possible. I see no one; besides, Paris is not what you have seen it, it is the shadow of itself. What more can be done? I am working, trying to make the future profit by the lesson, for I do not consider myself as discharged from duties. Do the same yourself, in spite of your too well-founded grief: work is the only consoler. — *Donnez-moi de vos nouvelles et croyez-moi bien à vous.*"

Among his lesser plans for the future, he had partly arranged an excursion with us to the Orkney Islands, to examine their rocks and correlate them with those of Switzerland; and also to sketch scenery that had impressed his imagination ever since reading Sir Walter Scott's romance of "*The Pirate*," when a boy of eleven. This *ultima thule* of our cherished hopes it was decreed should never be reached. Viollet-le-Duc died suddenly of apoplexy, at Lausanne, in September, 1879, before completing his sixty-sixth year. He had no warning that his race was run: all was reft at once. A fortnight before, he had said that, humanly speaking, he hoped to live twenty years longer — ten more for work and ten for rest. Only the day before he was struck down, he verified some geodesical observations he had recently made in the mountains, and gave the finishing touch to the last of his beautiful *aquarelles*. A few evenings earlier, for the first time in his life, this valiant worker was heard to say, "*Je suis fatigué.*" He died in the full strength of all his powers, whilst doing the State and mankind much service. Sovereigns and learned societies beyond France had bestowed honors upon Eugène Emmanuel Viollet-le-Duc; from this Institute, he received the Queen's Gold Medal, and from our Royal Academy of Arts, the diploma of Honorary Foreign Academician. These distinctions were valued by him at their true worth, from the motives that prompted the giving; beyond that, no man cared less than he for adventitious honors. Free from all trace of vanity or egotism, averse to every kind of personal display, he was quite content with the "golden mediocrity of his fortune" won by his own labors.

BOOKS AND PAPERS.

THIS[1] is an admirable work; it is written with the enthusiasm which is quite justified by the interest of the subject, and at the same time with a tempered sobriety of tone which maintains the reader's respect for the enthusiasm as never going astray into vagueness and extravagance. Those who are aware of the extent of the services of Miss Stokes to the antiquities of Christian Ireland may be a little discontented at her self-effacement. All obligations to other writers are frankly and gracefully noted, but it is only to herself that she is parsimonious of acknowledgment. It is well that those who are charmed by her lucid exposition and perspicuous style of writing should know also how much they owe to her accomplishment as an artist in reproducing with most conscientious exactness the intricate and elaborate designs which are the greatest achievements of the genius of Ireland in its earliest Christian period.

The last chapter of the work treats of "Building and Architecture." Starting from cromlechs, dolmens and kistnæns we come to stone-forts or dunes, of which the walls and doorways have the appearance of primæval construction upon which that of Mycenæ was only an advance as carried out with command of greater resources. Then follow the monastic cells built on the beehive principle of the so-called treasury of Atreus, though without the covering of earth. Stone churches grouted or with cement succeed, then arches false and true, jambs and imposts with chamfered edges and roofs, sometimes of shingles and sometimes of solid stone.

There is no longer any mystery as to the nature or origin of the Irish round towers; they are not pagan but Christian erections — in fact, ecclesiastical bell-houses. Dr. Petrie and the late Lord Dunraven made complete examinations of them, and followed the traces of the builders of them across the Continent to the group of their most remarkable prototypes at Ravenna. "Only the oldest and simplest type of such belfries ever reached Ireland and Scotland, and their singularity does not consist in their form, but in their isolation. The round tower with conical top was a common form in the earliest periods of Christian architecture — when a watch-tower and keep for the monastery became necessary, when war and rapine called forth the symbol of pride and power in Irish Christian architecture, the lofty stronghold, bearing its cross on high, was erected in the cemetery and opposite the doorway of the church." There are sufficient remains to prove that a round-arched Romanesque style even considerably ornamented had been introduced into Ireland before the eleventh century, and contrasting in certain respects with the Norman variety that came in later. In these remains the chevron ornament is prevalent and varied, and instances of fret, scroll and animal combinations are not infrequent; but it is not in architecture but in illumination and metal-work that we are to look for the exquisite developments of Irish taste and ingenuity.

The art of illumination was the first in date and most perfect in result. The "*Book of Kells*," now at Trinity College, Dublin, dates as early as A. D. 650–690, and marks a time when the art had attained its highest excellence. It is the earliest preserved of the monuments, including metal-work, crosses and croziers which include in their ornaments the so-called trumpet pattern or divergent spiral design. The latest is a tombstone dated A. D. 1085 in the valuable chronological list at the end of the volume. Intermediately it is seldom missing. Two lines starting from a central spiral diverge and open out like the mouth of a trumpet, then converge again and whirl to a new centre to leave it again and repeat the same figure. As regards these islands this is a true Celtic ornament; it occurs in connection with enamel in British works which are earlier than the Roman occupation. It is found susceptible of considerable variation. On some Celtic shields of brass in the British Museum, it assumes elongated forms in graduated relief of great elegance.

The illuminator of the "*Book of Kells*" seems to delight in exhibiting it in endless development. Sometimes we see a plain spiral as if of a single wire, then the centre of the spiral is occupied now by a double, now by a triple rounded return, and these sometimes end in a bird's head; sometimes the spirals are paired like Ionic volutes of equal size and sometimes unequally. This ornament has a peculiar interest in reference to architecture, which becomes especially salient upon observation of its metallic forms. It vanishes in Britain under the Romans, it disappears in Ireland as in England almost absolutely in the period of round-arched Romanesque architecture, but the predilection for the form reasserts itself later, and is the true suggestion of the treatment of bosses and foliage in the early English style of architecture. Trefoils and quatrefoils are returned upon themselves with a tendency to bulbous terminations, and when the leaf character is more decided, there is a leaning to a knobbed or lobelike elevation within its margin which at once recalls the characteristic treatment of the raised Celtic spirals. Many of the combinations in the Irish designs are identical with some of those which have been brought to light from the graves on the acropolis of Mycenæ, and many others appear to be only fanciful variations from certain others of the same origin.

It would, however, be fallacious to infer any ethnological connection as concerned in the matter. Certain simple combinations of spirals as of straight lines are the obvious resources of early art for giving a degree of variety to plain surfaces. The cable, the fret and the zigzag, the square, oblong, diamond, cross and knot, are common stock and property of Indian, Mexican, Pacific islander, islander of Greek Archipelago, Egyptian, Assyrian and Esquimau. The peculiarity of the Irish artist is first the great variety which he introduced into the treatment of these common materials, and then, moreover, of those more special kinds of ornament which were gathered by him or followed him from the different tribes of the Continent into that island which was still more secluded from original contact with the rest of the world than even Britain in its proverbial remoteness; and, lastly, in the marvellous skill and taste with which he could combine specimens of all these in the elaborate enrichment of a single initial letter or a far more comprehensive monogram.

The simplest elements of these combinations are plain lines disposed symmetrically as in angular frets, or in more or less complicated knots, filling spaces of various forms, or following on in a band which varies in breadth. Then, by an advance in complication some animal form is introduced winding and entangled among the knots, a snake or some exaggerated elongated quadruped, with limbs strangely contorted. Again, human heads appear, and by attention it is usually possible to trace arms and legs also, but in very unexpected positions. Sometimes a serpentine or lacertine figure is combined with a human figure all intertwined in a maze of interlacing cords. We observe here something akin to the stratagem by which the Saracenic ornamentalists combine intricacy with distinctness; it consists in their case in making a strong contrast between the general breadth of the winding bands and some which are suddenly widened out breadths and surfaces. The contrast in the Irish designs is not so extreme, but valuable contrast and definition are obtained by comparative uniformity of the more slender and more multitudinous bands with the more visible, however still limited, graduation in breadth of the bolder member which is allowed at the same time a sweep of more liberal freedom.

The decorators of the Greek vases of very early style are given to exerting their ingenuity in combining a great variety of patterns with a certain degree of symmetry. The effect obtained is very much that of patchwork; detached bits of what form elsewhere continuous simple borders are arranged in bands contrasted in breadth or disposed with certain reference to a centre. These are the simplest efforts of obtaining the charm of variety without quite forfeiting a general sense of unity and interconnection which are traceable in the patterns wrought by American Indians, and in the carved oars and weapons of South Sea islanders. The motive is universal in early times and the times which succeed are often indebted to them for enrichments of refined and chastened elegance. But apart from early Irish work we might not have known the full extent to which variety and intricacy could be harmoniously combined in different patterns, and these, again, associated in a manner which defies reduction to any intelligible principle and yet is as satisfactory to artistic feeling as it is interesting to the eye which is detained by it as if by fascination. The Tara brooch, which was picked up by a poor child on the seashore in 1850, is overlaid with no less than seventy-six varieties of designs, all of which exhibit an admirable sense of orna-

[1] "*Early Christian Art in Ireland.*" By Margaret Stokes, with one hundred and six wood-cuts. Chapman & Hall, 1887.

mented beauty and happy fitness for their relative situations: to appreciate their perfect execution a lens of no moderate power is necessary; their character is that of the style which was in vogue during the three or four centuries anterior to 1000 A. D.

The Ardagh chalice, dug up in a potato-bed, must belong to the same period. The taste for a combination of metals in both these beautiful works again reminds of the prehistoric art of Mycenæ — as the bronze swords inlaid with combats and lion hunts in gold. The chalice is composed of gold, silver, bronze, brass, copper and lead. The sceptre of the great statue of Olympian Zeus, by Phidias, was composed of a variety of metals, and there can be no doubt that the chariot of Here, as described by Homer, is only a poetically exaggerated example of a still more ancient taste for ornamentation by direct metallic contrasts:

She then hastened to harness the golden-filleted horses,
Here, goddess aweful, daughter of mighty Cronus;
And to the chariot Hebe applied very quickly the curved wheels,
Brazen, eight spoked — at the ends of the axletree of iron;
Golden the felloe of these, indestructible; but outside
Tires of brass were attached to them close, a marvel to look on;
And the central revolving naves on either side are of silver;
And the chariot body with straps of gold and straps of silver
Was tightened on, and the rims in a curve were brought round double;
And from it extended a silver pole, and on its forepart
She bound on a beautiful golden yoke, and the broad breast-straps
Beautiful, golden, attached; and Here under the yoke led
The swift-footed horses, astir as she was for strife and warshout.

The chalice, however, was further enriched with enamels by an art which was practised in Gaul and Britain anterior to Roman domination, and unborrowed from either Rome or Greece.

In closing our notice of this work of Miss Stokes, we must once more give expression to our sense of a most unusual combination of antiquarian sympathy with sound judgment and graceful literary skill. W. Watkiss Lloyd.

COMMUNICATIONS

ILLUSTRATIONS OF BOSTON PUBLIC BUILDINGS.

New York City, May 9, 1888.

To the Editors of the American Architect: —

Dear Sirs, — There are many readers of your paper who would be glad to know what you are building or going to build in Boston for your Public Library and your new Court-house. As Boston is the leading architectural city of our land, we are interested in your success in getting what we can only admire and long for.

Yours very truly, Wm. H. Ingersoll.

[The architect of the Suffolk County Court-house has repeatedly informed us that he was unwilling to have the design published in its present form. The Boston Public Library drawings will be published in full within a few weeks. — Eds. American Architect.

AMERICAN *vs.* FRENCH ARCHITECTURAL TRAINING.

New York, May 12, 1888.

To the Editors of the American Architect: —

Dear Sirs, — In Mr. Avery's account of the Architectural League meeting of May 7th, published in your last issue, reference is made to the work of the pupils of three Architectural Schools in this country, and their work as shown to the League is said "not to be compared to that of the famous Paris Ecole des Beaux-Arts for originality in composition, freedom of expression, or cleverness in interpretation." The three schools mentioned are those connected with the Metropolitan Museum, Columbia College and Cornell University. There would also have been an exhibit from the Massachusetts School of Technology, if this school had not recently sent its best drawings to the Glasgow Exhibition. From the Exhibition, it was evident that the course of instruction at Columbia and the Metropolitan Museum followed the model afforded by the Beaux-Arts, and while I have not had the pleasure of seeing a large number of the drawings made at the Paris school, still, judging from what I have seen it struck me that the New York schools did fully as well in the respects above mentioned. Considering that the course at the Museum embraces only six months' work the results are highly creditable, and as far as the work at Columbia is concerned, it seems to me to have a promise of far better results than its famous model, while its present performances equal it save perhaps in a certain scholastic largeness of conception. And why should it not equal it? It is not a difficult matter to follow the course of the Beaux-Arts. Even without the aid of its fine corps of instructors, its splendid quarters and models, and its prize of Rome, it is open to any school to take Rome and Greece (Rome first) and achieve the elegant, monotonous and scholastic results, characteristic of French architecture of to-day. The question is whether it is wise to allow the Beaux-Arts influence to have such an extensive sway among our schools. Do the results warrant the high encomiums heard on all sides? Are washed drawings and a slavish adherence to a debased style sufficient ends for the training of pupils? I can imagine that there is a wide divergence of opinion regarding this, which I hope may find its proper expression. Meanwhile, it is instructive to notice that the Cornell school has made a break. The drawings from this school made an effective contrast to the others at the League meeting. It was evident that the problems of design submitted to the pupils were modern ones, and that the tendency was against the Beaux-Art's influence. As might be expected the designs were suggestive of modern architects' work, particularly H. H. Richardson. Mr. E. H. Kendall made a practical suggestion which it is hoped may be heeded, for it would greatly encourage and help the schools if architects should adopt the plan of seeking assistants directly from their graduates. I am yours, etc., F. A. Wright.

NOTES AND CLIPPINGS

Stories of Two Greek Numismatists.— Some forty-four years ago there appeared in London a young Greek gentleman called Timoleon Pericles Blasto. He came to London highly recommended by more than one foreigner of distinction, and thus got permission to study the collection of Greek coins in the British Museum. He very soon proved to the officers in charge of the medal room that he was an accomplished numismatist. His knowledge of coins was great, his devotion to the subject greater; for a whole month he came every day to study the magnificent collection accumulated ever since the time of Payne Knight. His manners were ingenuous, and ladies thought him quite fascinating. At the end of the month, just before he left England, an accidental discovery revealed that a rare Greek coin was missing. Further search disclosed the fact that a large number of the rarest coins had vanished, and had in many cases been replaced by inferior specimens. The authorities of the museum were appalled; but fortunately they lost no time in putting their case in the hands of the ablest detective then known at Scotland Yard, the celebrated Mr. Field. By a dexterous *coup de main* Mr. Field captured in a few hours Timoleon Pericles and all his booty. He was tried at the Old Bailey, pleaded guilty, and convicted. His sentence was seven years' transportation, which of course was commuted on account of his exemplary conduct. He was consigned to the model prison at Pentonville, where he was seen by sympathetic lady visitors reading Sophocles and Euripides in his cell. Before his trial he tried to avert the operation of the law against felons, as it then stood, by conveying all his goods and chattels to a friend on the morning of the day of his conviction. But British law was equal to the occasion. The conveyance of his property was pronounced null and void, because the Court said that there was no such thing as a half or fraction of a day. He was convicted on a given day, therefore the conveyance executed on the morning of the same day was void. Thereupon his coins, as the property of a felon, were forfeit to the Crown, and were handed over to the Treasury; which, after restoring to the British Museum all they claimed, proceeded to invite other claimants to prove their ownership. In due course the residue, consisting of some rare coins, remained in the hands of the Treasury unclaimed, and were ultimately handed over to the British Museum. I will not pursue the career of Timoleon Pericles further, except to say that his memory was honored in the Levant with that of other victims of British law, and that one of his old friends at Smyrna said of him, "Cependant c'etait un charmant garçon." The other distinguished numismatist who has this year rivalled the exploits of Timoleon Pericles, is a Greek whose name I withhold because he will probably be the subject of a criminal prosecution at Paris before long, and also perhaps in Greece. Some time ago it was announced that all the rarest coins in the national collection at Athens had been stolen; and this was followed shortly afterwards by the news that MM. Rollin and Feuardent, the well-known *antiquaires* of Paris, had been robbed of a collection of Greek and Roman gold coins valued at £20,000. The police of Paris soon got on the track, and, swooping down on the culprit found in his lodgings nearly all the coins stolen from MM. Rollin and Feuardent. These on examination proved to be identical with the coins previously stolen from the museum at Athens. It seems that the thief escaped from Athens with his booty, sold it to MM. Rollin and Feuardent, and then, getting into their premises, recaptured it, with a view, probably, of reselling the coins in America. The saddest part of the whole story is that the two keepers of the Athenian Museum, who have always up to this date had a high character for integrity, have in consequence of this mishap "got the sack."— *B. B., in St. James's Gazette.*

Spontaneous Combustion.— The Gage Tool Company, of Vineland, N. J., writes thus to the *American Machinist:*

In 1883 the subject of spontaneous combustion was brought to our attention by the sweepings from the floor of our factory developing an alarming increase in heat when placed in heaps. The floor had been sprinkled and the sweepings were moist. During the afternoon they began to heat, and a thermometer placed in the pile, after it had been disturbed, indicated about 200° F. It being time to close the factory for the night, the sweepings were thrown out. One day during the next year a peculiar odor was noticed in the factory, which increased and became very unpleasant. This was found to emanate from a barrel of shavings and chips from the boring and mortising machines. These shavings and chips are removed from the throats of our plane stocks, which are previously saturated with warm linseed oil. When the cover was removed from the barrel, the fumes were quite strong; the shavings were so hot that the hand could not be held in them without being burned. This barrel was removed to a vacant lot, covered with an oil-cloth, and left. That night, during a heavy storm, the cover was blown off, and the shavings wet. They kept hot a long time but did not char. We then directed the removal from the building of all shavings and sawdust made from oiled wood as soon as made. During one day last

year we had been sawing the oiled plane stocks, and at night, when removing the box under the saw containing the sawdust that had fallen into it during the day, it was noticed to be very hot. It was placed at a safe distance from the building, and in the morning the sawdust was burning. A light, misty rain had set in during the night. The fire was extinguished, but the rain continued and increased. Before noon the dust was burning again. During the month of June last we were planing our oiled stocks on a hand (or buzz) planer, and (on June 10th) filled four sugar barrels with the shavings. Water had been spilled on some of the shavings that were put in one of these barrels, and these shavings soon began to heat. A thermometer placed among these shavings indicated a rapidly rising temperature, and at 6 P. M., of the next day the shavings at the top of the barrel began to char. They were then placed outdoors under a wrought-iron boiler bonnet, and covered with a metal plate. The next morning, upon removing the metal plate, we found that the shavings were charred and had shrunk into a cylinder-shaped mass, with a three-inch space between it and the sides of the barrel, making the shrinkage six inches across the top. Upon disturbing the mass it broke into flames. Later in the day sawdust (from oiled beechwood) that had been deposited in a box as it left the saw the day before, began to burn, setting fire to the pine box containing the dust. This box, with the dust, had been placed in an old iron smoke-stack lying upon the ground at a distance from the buildings.

The Late Professor Brune's Work. — Professor Brune, says R. Phené Spiers in the *R. I. B. A. Journal*, was not only a mathematician of the first class, but also an eminent and a most original artist. He commenced his career in the Ecole Polytechnique, from which school he passed out in the first rank — a position equivalent to a Cambridge wrangler. His artistic preferences, however, inclined him to study for the architectural profession. He accordingly entered the *atelier* of the late Monsieur Questel in 1858, and somewhat astonished that eminent principal by asking him how many years it would take to carry off the *Grand Prix*, that being a prize awarded every year, and for which the whole architectural talent of France is put into competition. As a matter of fact, M. Brune carried off with ease every medal of the school, passed into the first class, and eventually carried off the *Grand Prix* in 1863, that is to say, five years after his admission into the school — being about the shortest period on record, at least in late years. . . . His *Grand Prix* drawings astonished the painter-members of the Institut de France by the marvellous proportioning of the figures in the vault covering the Great Hall in his design, which was for the "staircase of a royal palace." The most remarkable drawings he executed in Rome were those of the Pantheon, which he selected as his measured-drawing subject. Instead of the conventional method of shading, with the shadows projected at 45 degrees, he copied the actual effects of shade as seen in the Pantheon itself; the marble columns were reproduced with a fidelity which would have delighted the heart of Mr. Alma Tadema, R. A. In 1865–66 he visited Egypt, and measured Karnak, Medinet Habou, and other Egyptian temples, which were subsequently published in Mariette Bey's work without any mention being made of their author. On his return to France, in 1866, having some small property of his own, he allowed two or three years to pass without taking up any serious work; but on the death of the Professor of Construction at the Ecole des Beaux-Arts he was persuaded to allow himself to be appointed to the post, and commenced the remarkable *Cours* which has just been published. Later on, he was appointed architect to the Ministry of Agriculture — a new building in the Rue St. Germain now being erected; and his last work was the house of President Grévy on the Trocadéro — a building which, though simple and unpretending on the outside, in its internal decoration and architectural treatment is one of the boldest and finest of modern days. The "*Cours de Construction*" just published is interesting, as showing the very high standard of acquirements to which the architectural student in France is expected to attain. There are probably few engineers in England who would be able to enter so minutely, and with such mathematical knowledge, into the various calculations made for iron construction of every kind. A second volume, dealing with stone construction, will probably follow.

The "Chain Pier," Brighton. — One of the most interesting landmarks of Brighton, the Chain Pier, is threatened with extinction, as is mentioned in a paragraph headed "Brighton," in our "Provincial News" this week. The *Daily News* says that of late years the pier has suffered by the competition offered by its newer and larger rival, and by the westward course of fashion, but at one time it enjoyed a monopoly of patronage, and was almost as favorite and as fashionable a resort as the Steine was in the days of the Regency. Thackeray mentions more than once in his letters how he used to go on the pier in a bath-chair to recuperate when he came down to Brighton fagged out. This was in 1849. Six years earlier the pier (at that time used for a packet service between Brighton and Dieppe, before the Newhaven route was developed) was the scene of an event of special interest, inasmuch as Queen Victoria started thence on her first journey out of England, and went to visit Louis Philippe, King of the French. At this time the Princess Royal (now the Empress of Germany), the Prince of Wales, and the late Princess Alice were staying in Brighton at the Royal Pavilion, and the Queen, on her return from the Continent, landed from the Royal yacht at the Chain Pier, and accompanied by the Prince de Joinville, paid another visit to Brighton. In September of the same year she embarked from the Chain Pier to visit the King and Queen of the Belgians. These were the palmy times of the pier, which had then been open about twenty years, having been completed, at a cost of 30,000*l.*, in 1829, from plans by Captain Samuel Browne. The graceful curves of the suspensory chains, and the blackened timbers which support the four towers, and the deck at the head, are familiar enough to Brighton visitors, and the structure has compared more than favorably, in picturesque appearance, with pleasure piers of later date. When erected, it was regarded not only as a thing of beauty but as a triumph of engineering skill, and it certainly stood the test of time and the buffets of the waves in the manner at once satisfactory and remarkable. Twice, however, it seemed to have reached a crisis, as it was severely damaged in November, 1836, and again in October, 1838, on one occasion being cut asunder by a tremendous storm, but, being repaired, it has since sustained, unharmed, the shocks of the severest tempests. — *The Builder.*

The Death of Ludwig Nobel. — The engineering profession has suffered a severe loss in the death of Mr. Ludwig Nobel at Cannes. The son of a Swedish engineer, who invented and placed in the channels of Cronstadt the "infernal machines" which annoyed Sir Charles Napier so much, he received a practical training as engineer, and notwithstanding a temporary check experienced by the failure of his father, he managed by hard work and economy to recover in time the ironworks his father had lost, and extended them to their present proportions at St. Petersburg. But it was less in his own profession than outside it that he was destined to achieve distinction, although it was his engineering capacity that equipped him for the revolution he accomplished in the oil trade. In this respect his career was a striking illustration of the influence a modern engineer can exercise upon a purely commercial pursuit. Quite by chance, in 1870, he was led by his brother, whom he had sent to the Caucasus in search of walnut wood for the stocks of the Berdan rifles he was manufacturing for the Government, to invest a few thousands in a small Baku oil refinery. This failing to yield much profit, owing to the difficulties of transport, Mr. Ludwig Nobel applied himself seriously to solve some of them, and by degrees was drawn completely into the petroleum business. The innovations he introduced in the shape of pipe-lines, tank-steamers, and tank-cars for railways not only in a few short years revolutionized the oil trade of Russia, but that of the whole of Europe; the elaborate system of transport in bulk he established, coupled with the copious supply of cheap oil, enabling Russian petroleum to penetrate to every town on the Continent, and even flood the more distant market of India. The enormous magnitude to which his undertaking rapidly expanded, until the few thousands he embarked in the business developed to a capital of three millions sterling, was told in these columns three years ago by Mr. Charles Marvin, whose "Petroleum Industry of Russia" contained in all engineering essentials the story of the Baku oil-king's extraordinary career. To-day the Nobel firm owns the largest oil refinery in the world, the largest fleet of tank-steamers, thousands of oil trucks, and depots holding tens of millions of gallons of oil. That so much should have been achieved in a little more than ten years is a remarkable testimony to the power of organization Ludwig Nobel possessed to an eminent degree, while the wealth he amassed in a pursuit wherein merchants had either failed or made but a miserable income, shows what may be achieved by the enterprising and skilled engineer in departments of trade conventionally supposed to belong to merchants only. — *Engineering.*

More Myths from the Mayas. — The Garden of Eden is given a new location — in Central America — by Mme. Alice Le Plongeon, who with her husband, Dr. Le Plongeon, the eminent man of science, spent fourteen years in Yucatan, studying the antiquities of that country. Mme. Le Plongeon is also a firm believer in the submerged continent, Atlantis, which Ignatius Donnelly wrote about before he began to annihilate Shakespeare. She says that among the manuscripts of the Mayas, the prehistoric inhabitants of Yucatan, is an account of the sinking of Atlantis, which once joined America to the western coast of Africa and Europe. Other Maya writings give us, she asserts, the whole history of the intellectual development of the human family, free from all priestly or philosophic tinkering. The palaces and temples of the ancient race are situated in almost inaccessible forests, and the Spaniards are worse than indifferent in respect to archæological researches. They are unwilling to have their land disturbed for the sake of digging up a few more antiquities. Mme. Le Plongeon hopes that when her husband's book about Yucatan appears, as it will shortly, wide interest will be awakened in the matter of further investigations. The two explorers brought back with them to New York 2000 photographs of the pre-historic edifices, and hundreds of drawings and models. Among the latter is a representation of the mausoleum of King Caw, the first ruler of the Mayas. Mme. Le Plongeon thinks that this could be reproduced exactly in Central Park, forming an object lesson in the religion and customs of the race. She became interested in the old civilizations of Central America from her study of the relics in the British museum, and went from London to Yucatan at the age of nineteen, just after her marriage. She learned Spanish and the Maya tongue, which she says is very much like Greek, and which is still spoken by the natives. Making due allowance for the exaggerations caused by her enthusiasm, the field in which she and her husband have been working is a valuable one, and they should receive encouragement from rich people interested in archæological matters. — *Springfield Republican.*

The Waste of Oil at Baku. — The cost of sinking a well at Baku ranges from £1,000 to £1,500. What can be obtained for such an expenditure may be illustrated by the result of boring the Droojba well, which cost £1,500. This spouted for 115 days, the yield being 3,400 tons a day for 43 days, 1,600 tons a day for 31 days, 900 tons for 30, and 600 tons for 11 days. The well was then capped over, and the supply kept underground for further wants. The total amount of oil spouted by this well, according to the lowest estimate, was 220,000 tons, or 55,000,000 gallons, and according to the highest, 50,000 tons, or 125,000,000 gallons. Had the oil been in America, it would have realized a million sterling. At Baku the bulk of it was lost. The same was the case with the great Markoff fountain last year, which spouted oil and sand 400 feet high — a veritable volcano. On windy days the oil spray was carried eight miles away. The Markoff fountain was situated not far off the Droojba, which pessimists had prognosticated erroneously would drain the whole area. On this occasion the Russian Government, which had been angered by the waste of oil from the Tagioff fountain — which spouted 11,000 tons a day the previous year, and endangered the town of Baku by raining oil upon it, although

three miles away — gave permission to the other Baku firms to lynch the "gusher" at the owner's expense. Accordingly they sent their best engineers to the spot, and after several unsuccessful attempts the well was finally capped over, and a stop put to the disgraceful waste of oil. All the same, no law exists to prevent any foreigner or Russian repeating the same destruction to-morrow. Large firms, like Nobel Brothers, mostly manage to have good engineers, and the best appliances on the spot to check a "gusher" at the outset, and allow the supply to flow as they want it; but the native firms bore heedlessly, and for want of "caps" at the right moment, all control is lost over the well, and it belches forth millions of gallons of oil, forming rivers that flow away to the Caspian Sea or sink into the earth again. To-day's telegrams from Baku announce that such a one is spouting at the present moment, causing the price of crude oil to fall to twenty gallons for a penny. If there happens to be a slight rise in the price of oil — *i. e.*, if it rises above a penny for ten gallons — the large firms build reservoirs and catch some of the oil, for which they pay a mere trifle; but if oil is plentiful at the moment, no attempt is made to store it at all. Since 1871, when the first well was sunk, 500 bores have been made, of which 200 are in operation, producing, irrespective of fountains, 500,000,000 gallons of oil every year. — *Glasgow Herald.*

Cleaning Metal and Stonework. — During the year 1886 the masonry and ironwork of the Madrid and Baudin bridges at Paris were thoroughly cleansed by Messrs. Mathieu and Peigné, who work the patent processes of M. Liebhaber. These processes, which are purely chemical in their nature, were at first applied solely to the cleaning of limestones, but in these bridges materials of a very different nature were successfully dealt with. The surfaces to be cleansed are submitted to the action of a jet of mixed hydrochloric and sulphuric acids, and left for two or three hours, when they are well brushed, and finally washed down with a water-jet, which completes the process. In the case of limestone masonry, the hydrochloric acid unites with the calcium, forming chloride of lime, which is then decomposed by the sulphuric acid forming a calcium sulphate, this being precipitated on the face of the stone, and containing all the impurities, which are then removed by the action of the brush and of the water-jet. In many cases this acid treatment will not succeed unless the stone is previously prepared, as the masonry frequently becomes coated with a black and shining deposit of all the impurities contained in the atmosphere of a large town, which entirely prevents the acids reaching the stone. In this case M. de Liebhaber, before applying the acids, covers the stone with an alkaline paste, consisting of a mixture of carbonate of soda and calcium hydrate, which he has named "tolugene." This paste is spread over the face of the masonry with a trowel, to a thickness of from 1-2 to 1 millimetre, and left there for from three-quarters of an hour to an hour, when the excess is quickly washed down and brushed off, and the acids applied as previously described. In cleaning ironwork the "tolugene" alone is used; it is spread over the work either with trowel or brush, and in the course of an hour or so will have united with all the oil of the paint, leaving the red-lead on the work in the form of a dry powder, which can be easily washed off with a jet of water. The metal is said to be cleansed much better than by the older method of burning and scraping off the paint. For cleansing brickwork M. de Liebhaber makes use of the property which hydrofluoric acid possesses of separating the silica from silicates. The work is first painted with a solution of ammonium fluoride, and this immediately afterwards is treated with a jet of concentrated sulphuric acid, which liberates hydrofluoric acid *in situ*, and this immediately attacks the silicates, robbing them of their silica. The whole surface is afterwards thoroughly washed with water. With regard to the cost of the processes, a total of 502 square yards of masonry, of which about 165 were sandstone, were treated at the Madrid Bridge at a cost of from 6.7d. to 8.4d. per square yard, and brickwork at the Baudin Bridge cost 8.4d. per square yard, the prices including the cost of erection of such scaffolding as was necessary. With regard to the ironwork, the contract price was 10d. per square yard for plain work, and 1s. 3d. per square yard for moulded work, but the contractors are said to have lost money in carrying out this part of their contract. — *Engineering.*

The Inventor of the Electric Light. — The following letter has been addressed to *The Pall Mall Gazette*, by the Rev. G. H. Staite, vicar of Sutton Cheney, Hinckley: —

Knowing your love of fair play and readiness to ventilate hidden grievances, I venture to ask the insertion of this letter, in the belief that if the facts were known some among your many readers would be inclined to entertain the claims of the family of a man who spent his life and fortune on a recognized public work of the greatest importance. My father was the originator of electric lighting, his exhibitions extending from 1847 to shortly before his death in 1854. During that interval he expended a considerable fortune, and left his family penniless. There are at the present time his widow, aged 80, two daughters, and myself. That our claims to recognition are not unfounded will be seen from the following testimony: — Professor Tyndall — "*Fragments of Science*," vol. ii., p. 424: — "To keep the carbons at the proper distance under regulators were devised, the earliest, I believe, by Staite." "*Haydn's Dictionary of Dates*," later editions, "Electric Light: apparatus for regulating the electric light were devised in 1846 and shown by Staite and Petrie in 1848." Urquhart, "*Electric Light*," edited by Webb, 1880, page 161: "Staite and Edwards patented an electric regulator based upon the heating and expansion of metals by the current to be regulated. This idea, beautiful in itself, is really the original of the regulators used to-day, and the self-same principle is employed by Mr. Edison." And Dr. Siemens, page 173: "Staite as early as 1847 patented a lamp in which the lower carbon is controlled by a movable soft iron core acted on by a hollow electro-magnet." Fontaine and Du Moncel give similar testimony. The priority of the principle of automatic regulation, the *sine qua non* of electric lighting, was decided in my father's favor by the French Academy of Science, as recorded in *Le Courrier Français*, February 4, 1849. Of his many patents and improvements no use could be made by his family; practically, as far as they were concerned, they died with my father, although they were and are still available for subsequent workers in the same field. His family feel that they have entirely lost their fortune through his public enterprise. All their money, consisting of thousands of pounds, was sunk, and by the premature death of the inventor in his forty-second year, his and their hopes of any pecuniary return were irretrievably lost. It is this combination of facts which induces me to write this appeal, every point of which I shall be most glad to substantiate should any one be kindly induced to notice it.

TRADE SURVEYS

General trade indications are more encouraging than they were six days ago. The effect of the nearly five months' restricted production is being felt in trade and manufacturing channels and benefit is also being derived from the trade combinations which have been formed. A third improving influence is the abundance of money in trade channels, or, more strictly speaking, from the defined policy of the Government in reference to bond purchases. A fourth benefit is felt from the announced intention of railroad builders to prosecute construction on a more liberal scale than for the past three months. The industries are also encouraged by the receipt of a larger amount of business for fall and winter delivery than was expected thirty days ago. A number of minor advantages could be indicated, all pointing to the fact that there is an enormous capacity for consumption in the country, and that there is already a reaction in several trade channels. Nevertheless, prices are declining; the sentiment everywhere is in favor of letting them drop to their very lowest limit before making extensive purchases or entering into contracts for future delivery. The disposition of the tariff question, in a week or two, will remove one obstacle in the way of enlarging commercial operations. The manufacturing interests are generally well engaged. Iron-makers have more cause for complaint than others; prices are still downward in both crude and finished material. Southern iron is being offered in Northern markets, but its effect is to create apprehension, rather than do actual harm by its competition. Recently published iron-trade statistics show that last year's pig-iron production was 13 per cent greater than that of 1886; steel-rail production 33 per cent greater; rolled-iron production 13 per cent greater, while the nail output was 15 per cent less. Prices declined during the year from $21.50 for No. 1 anthracite iron, at tide-water, to $19; Gray Forge, from $18.50 to $16 50; steel rails, from $38.50 to $31.50; bar iron, from $2.15 to $1.90. Total imports of iron and steel and iron ore during the past year amounted to over $100.000.000; consumption of iron ore last year, 12,500.000 tons, of which 1.200,000 tons came from abroad. During the early part of last year wages advanced; during the early part of the present year they declined as much. The actual consumption of pig-iron last year was 6,800.000 tons against 6,191,354 tons in 1886, and 4,348.844 tons in 1885. There are at present 43 Bessemer steel-works in the United States, with 89 converters; 11 new Bessemer steel-works were completed last year. Railroad and financial developments are all of an encouraging character; bank statements show an accumulation of over $22,000,000 above legal requirements. Reports from 106 railroads for April show gross earnings at $23,556.242, against $22,814,206 for April, 1887, their mileage increase being 3,200 miles. For the first four months of the year, the earnings of 105 roads are reported at $92,624,743, against $89,762,462 for the same time last year. Recently weekly reports also show a gain as compared to last year. There is a disposition in railroad-building circles, to undertake the prosecution of work in several localities in the West and South, where the indications are favorable for assured traffic upon the completion of lines. Southern railroad managers intend to do a great deal of building, mainly of short lines, and indications from these States, for the past week or two, point to the early commencement of the work. The architects and builders in some localities are as busy as last year, but in many others the case is different. New England and the Middle States are suffering more than the Western and Southern States, but in certain portions of New York and Pennsylvania there is fully as much work in hand now as last year, as is shown by a heavy distribution of lumber, lath, slate, cements, inside finishing and all other building materials. In the Northwest, according to indications from Chicago, St. Paul, Omaha and Kansas City, architects have a great deal of work in sight, and the season will be a busy one at all of these centres. The distribution of lumber is not as profitable as last year, but the volume is as great. A great amount of elevator building is being undertaken. A great deal of machine-shop and round-house building is being done by Western railroads. The phenomenal activity in the Southern States continues, and the overflow of Northern men to the South during the past few months has laid the foundation for a still greater influx of capital and enterprise. An organized attempt has been made to influence emigration Southward, and an office has been opened to engineer the movement in New York City. It will be difficult to overcome the preference in the minds of Europeans for the great West, but it is only a question of time when the advantages of Southern locations will be demonstrated more clearly. The present weekly production of iron in the United States is 122,552, against 138,514 tons last year. The erection of new manufacturing concerns throughout the country still continues. The manufacture of glass, especially window, is steadily increasing, gas-field centres being selected for new enterprises; at one of these centres there are now twelve works, with several new enterprises to be heard from. The manufacture of engines, machinery, tools and implements of all kinds, report an improving inquiry for nearly all kinds of work within the past week or two. The car-builders report no cessation of activity. Railroad managers intimate that they will place large orders for rolling-stock this fall for delivery during the winter and spring; the increasing volume of traffic justifies this prediction. The downward tendency in prices will probably reach its extreme limit in October; the placing of a large amount of business and delivery next spring and summer will follow. Quite a number of manufacturing establishments, such as machine-shops, car-works, foundries and saw-mills, are starting up in the far West. The employment of capital in the smaller industries is helping to tide over the depression in other branches. The business interests are anxiously awaiting the disposition of the several important questions now before Congress; no doubt the volume of business is from five to fifteen per cent lighter than it would be but for the fact that there are issues to be decided and laws to pass which can vitally affect the business interests of the country. But with all the uncertainties there is an undertone of confidence in commercial, manufacturing and railroad circles that warrants the belief that it is only a question of time when there will be a general improvement in business, manufacturing, railroad construction and in all of the smaller industries.

S. J. Parkhill & Co., Printers, Boston.

THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. XXIII. Copyright, 1888, by TICKNOR & COMPANY, Boston, Mass. No. 648.

MAY 26, 1888.

Entered at the Post-Office at Boston as second-class matter.

CONTENTS

WE regret sincerely to hear of the death of Mr. Carl Pfeiffer, a distinguished architect of New York, which occurred very suddenly while he was travelling in the South. Mr. Pfeiffer was born in Germany, where he received a very thorough education as an engineer, with which he joined, as is not unusual in Germany, a considerable amount of architectural study. He came to this country about twenty-five years ago, and, after some experience in the West, established himself in New York as an architect. He soon gained high distinction, not only for his designs, of which the fine church on the corner of Park Avenue and, we believe, Thirty-fourth Street, is an example, but for his skill in interior arrangement, and in heating and ventilating his buildings. His most noted work in this branch of the science of architecture is, perhaps, the church known as Dr. Hall's, on Fifth Avenue, which was described by Captain Douglas Galton, one of the best authorities in the world on the subject, who examined the church with great interest, not only as far superior in warming and ventilation to any European structure of the kind, but as presenting a perfection in these respects which had not even been dreamed of on the other side of the Atlantic. We cannot here attempt to give a list of Mr. Pfeiffer's works, which include, besides many private houses, hospitals, churches, apartment-houses, hotels and other buildings, but in all of them great thoroughness and ingenuity of construction were added to a very pure taste, both in composition and detail. In his professional life, Mr. Pfeiffer stood among the first for his high-minded enthusiasm for his art, his strictly honorable practice, and his devotion to professional interests. He was one of the earliest members of the American Institute of Architects, and was always active on committees, or in other ways, wherever he could see an opportunity for advancing professional ethics or efficiency. He was one of the first to welcome the idea of a society for mutual defence, as adopted by the French architects, and endeavored to interest his friends in it, long before it was taken up by the great professional societies. Although his health was always delicate, he was an earnest student as well as an active practitioner, and to a profound knowledge of his art he joined a refinement and courtesy which gained for him the highest regard among those who had the pleasure of his acquaintance.

AT the risk of doing some unintentional advertising, we would like to call the attention of our readers to the new "non-corrodible" iron pipe which has just been placed on the market. It is furnished in cast-iron for waste-pipes and in wrought-iron for supply-pipes, and is claimed to give perfect protection against rust, at a cost little greater than that of the unprotected pipe. The process is said to consist in the impregnation of the iron with hydrogen, a piece of metallurgy which we may leave to experts to discuss, but if the treatment, whatever it is, will really permanently prevent wrought-iron from rusting, we may expect to see a rapid revolution in domestic metal-work. To say nothing of stoves and furnaces, steam, hot-water and smoke pipes, if small hardware can be properly protected in this way, most architects will soon begin the study of wrought-iron details for nearly every portion of their buildings. However bright and attractive brass and bronze may be, they are far inferior in style and artistic quality to wrought-iron, and the day that sees the cheaper metal well designed and skilfully executed, freely used about our houses will be a happy one for architecture.

IN wrought silver and metal work, much of which now is very pretty, the processes are similar, but brazing, or joining with hard solder, is substituted for welding, and the articles produced have not quite the homely fascination of the iron ones. In place of it, however, they may be treated with a perfection of finish unknown to iron. In imitation of the Japanese, the Germans, and still more the Americans, who surpass them in their treatment of silver, decorate the metal with enamels of different colors, or with tints produced by the action of sulphur, or by simple oxidation. Besides the innocent pursuit of fine art in hammered silver, copper and iron, however, the Americans exercise another industry of less commendable character. At present, particularly in Paris, many statuettes, ornaments and small objects are made of cast metal, bronze or zinc, highly finished by hand. Specimens of the best of these are secured by agents in Paris and shipped to New York, where they are sawed in pieces, the pieces used as patterns to make moulds from, and great numbers of castings immediately turned out, which are soldered together, so as to present a tolerable counterfeit of the original object. There is a difference, since the reproduction shows only coarse traces of the beautiful and costly hand finishing of the original, but the resemblance is close enough to secure a sale for a large number of copies at highly remunerative prices.

THE *Wiener Bauindustrie-Zeitung* gives a curious account of the present practice of metal-work, which, we must not forget, owes its revival as one of the most beautiful of the smaller arts to the late Viollet-le-Duc, who educated, with infinite pains, a small body of iron-workers until they were capable of appreciating, and in some degree emulating, the skill of the mediæval blacksmiths. Every one knows that in Germany, particularly about Nuremberg, wrought-iron work is now produced in endless variety, which possesses a charm hardly found in any other detail of architecture, and, as the Germans themselves think, far surpasses in interest and artistic value the brass and bronze work which formerly occupied the place into which it is now rapidly making its way. With the Bavarians a good wrought-iron chandelier is now much more highly prized than one of brass or bronze; and with reason, for the intellectual effort required to execute the iron one is of a much higher order than is needed for the drudgery of filing and polishing brass; and iron candlesticks, match-holders and other small objects, full of interest and style, are in use everywhere as ornaments. It is interesting to know that for a good deal of this sort of work the iron is manipulated cold. The smith takes a piece of bar-iron, and hammers and draws it while hot into a suitable form, avoiding joints and knots. He then draws on a piece of the best sheet-iron the outlines of a leaf or petal. This is formed on the anvil to the modelling desired, by skilful and careful hammering. In the portions which are to be in high relief, the effect of the tool would be to draw the iron out too thin, or even to punch holes in it, if it were not so handled as to move the hot metal from the edges, where some thickness can be spared, to the central portion of the depressions, where it serves to reinforce the places most stretched in working. When the roughing-out is completed, the leaf then varies in thickness according to the modelling of its surface. The veins and surface-markings are then put on by punches, and the edges finished with the file. After this is done, the most difficult part of the work, the welding together of the petals or leaves into flowers and sprays, yet remains, requiring sometimes a hundred heatings of the object, which must be managed within very narrow limits, so as not to burn the

metal by too great heat, or risk imperfect joining by keeping the temperature too low. A second touch of the file, with a coat of fine black paint, completes one of the most charming little objects of household art that can be imagined.

THE subject of the manufacture of cement from iron slag has become an important matter. Not long ago ground slag was often added to Portland cement, but was virtually a mere adulteration, injuring the quality of the cement, and useful merely as a means of defrauding customers, under color of a theoretical similarity in chemical composition between the cement and slag, which might be quoted with good effect by a plausible salesman; and a few years ago a convention of German cement manufacturers denounced the addition of slag as dishonest and useless. Now, however, by persevering effort, the art of making good cement from slag has been greatly developed, and it seems quite probable that the next decade will see the completion of two great industrial achievements, the production of a cheap and excellent cement from materials almost everywhere available, and the profitable utilization of one of the most cumbersome waste-products known to the arts. The extent of the resources which the manufacturers of the new cement have to draw upon may be judged from the fact that, in addition to the mountains of iron slag which already cover the smelting districts of Great Britain, the English furnaces now in blast furnish nine million tons of fresh slag every year, while those of the United States are not far behind their British rivals, and the French and German furnaces turn out nearly as much more. As a barrel of cement weighs on an average about four hundred pounds, the annual British product of slag alone, if it could all be utilized, would afford forty-five million barrels of cement — enough, if made into concrete, to build a dike fifty feet wide, and a hundred feet high, across the English Channel.

WITHIN certain limits, the chemical composition of iron slag is nearly the same as that of cement, both being composed of lime and clay, with a little magnesia and alkali. An important difference, however, consists in the relative proportions of lime and clay, the foreign Portland, like our Rosendale cements, containing about two-thirds lime to one-third clay, while the iron slag varies from equal parts of clay and lime, in that from hematite ore, to one-third lime to nearly two-thirds clay, in the Cleveland ores. As it is well understood that cement, either natural or artificial, containing more than one part clay to two parts of lime is inert, and incapable of setting, either in water or in air, the solution of the problem of making slags into good cement must obviously lie in the direction of adding lime to it in sufficient quantity to give the proper proportion between the two principal ingredients. The history of the manufacture of Portland cement has already shown that in order to do this efficiently an extremely thorough grinding and mixing is necessary; and the successful modern processes for the manufacture of slag cement secure this in various ways. The process now in most extensive operation appears to be that invented by Messrs. Bosse & Walters, of Brunswick, in which the slag, hot from the furnace, is run directly into cold water. This has the effect of granulating it; and after cooling, and drying thoroughly, the mass is coarsely ground and sifted. Meanwhile one part of lime to every three parts of slag has been slaked, by immersion in water, dried, and separated by a fan from the heavy and unburnt particles which may have been contained in it. The proper quantities of sifted slag and lime powder are then introduced into a corrugated cylinder, together with a number of small cannon-balls, an inch or more in diameter. After turning slowly for two hours, the cylinder is found to be filled with a very intimate admixture of the slag and lime, in powder so fine that most of it will pass through a sieve containing forty thousand meshes to the square inch. This is the slag cement, ready for use. In rapidity of setting, the new cement resembles our Rosendales more than the Portlands, the time to the first induration varying from two to eight hours, while Portland cement often sets in half-an-hour. In use, the slag cement resists the action of water better than Portland, and it is entirely free from disposition to swell in setting. In tensile strength the Portland cement is superior for the first month or so after setting, but the slag cement then begins to gain; and a few months later the strength of the slag cement, either pure or mixed with sand, is in some cases nearly double that of Portland cement. In other respects, the two sorts of cement closely resemble each other, so that the slag compound seems quite as desirable for use as the rather uncertain Portland, while the price is much less, mortar made with three parts sand costing now only two-thirds as much with slag cement as with Portland, while the manufacturers assert that with a little more experience the slag cement can be made and sold at a profit for ten shillings a ton, or less than fifty cents a barrel. This is little more than one-half the price of our native Rosendale cements; and if the iron furnaces of Pennsylvania, Ohio, Tennessee and Alabama could produce a first-rate article, at anything like the same price, they ought to find the profits of their business materially increased, while the people of the country would be benefited by having one of the best and most useful of building materials put within reach of the slenderest purse.

THE Italian army which has recently completed its rather innocuous campaign in Abyssinia was equipped with military balloons, managed by parties properly drilled for the service. The only difficulty about using this very modern weapon in the African wilderness was, very naturally, the inconvenience of carrying with the expeditionary troops the apparatus and materials necessary for producing gas for inflating the balloons; and, according to the *Revue Industrielle*, the Italian military engineers solved the problem by carrying with them a supply of hydrogen gas, compressed into steel tubes. The gas was made at the arsenal in Naples, by treating iron with sulphuric acid and water condensed by machinery, and forced into cylinders five inches in diameter, and four and one-half feet long, made of steel about three-sixteenths of an inch in thickness. The pressure in the cylinders is enormous, amounting to nearly a ton to the square inch, but the gas is rendered in this way very portable, and forty cylinders, which a strong horse could easily pull in a cart, or which twenty men could carry on their shoulders, contain gas enough to inflate one of the balloons employed.

LA SEMAINE DES CONSTRUCTEURS contains some sarcasms at the expense of the statisticians of the Canton of Zurich in Switzerland, who in their efforts to classify acceptably their fellow-citizens, have, apparently, found it necessary to dignify most of them with the title of "artists." Thus, under the general head of "Artists" in the official schedule of occupations, are to be found, not only painters and sculptors, but dentists, chiropodists, riding-masters, dancing-teachers, acrobats and proprietors of learned dogs and two-headed calves, besides representations of other branches of art. One of the Swiss papers gravely asserts that a discussion arose among the statisticians of Zurich, whether umbrella-makers should be classed as artists or not, but, on being put to vote, the question was decided in the negative. It is a pity that the officials should not have studied the American customs in these matters. With our "art" furniture, "art" cooking-stoves and "art" manufactures in general, there would certainly be some way of including the umbrella-makers, and, indeed it is difficult to see who could be left out of the roll of artists, except, perhaps, the lawyers and doctors, who have yet, we believe, to introduce "art" briefs and prescriptions.

AN earnest appeal has just been made in the Vienna technical journals for the formation of an Austrian Association of Engineers and Architects. In Germany architects and engineers are educated together up to a certain point, and the two professions are generally associated in the local societies, so that a national association of the same kind is likely to be of greater benefit to each component portion than two separate bodies would be. The Provisional Committee which issues the call describes the objects to be obtained by the formation of the new society as the establishment of insurance and pension funds, the defence of professional interests and rights, the suppression of abuses in professional practice, the regulation of competitions, and several minor matters, among these being the formation of a technical library for the use of members. The Austrian territory, in its lack of great centres of population, is less like Germany, where every little state has its capital, than it is to our own country, and our new professional association, in the important task which should come before it, of making itself useful to the isolated members practising in small towns as well as to those who live in New York, Boston, Philadelphia or Chicago, may learn something from the experience of the Austrian society.

THE DECORATIVE USE OF COLOR.[1]

From the Rathhaus, Halberstadt. From Arkitektonische Rundschau.

THE title of this paper is intended to indicate the limits which I propose to myself in dealing to-night with a subject which admits of consideration from several points of view, and covers a very wide field. Of the scientific side of colors I propose to say little or nothing, and of that side of the subject which relates to the pictorial use of color I am also desirous of saying no more than is incidental to my own branch of the subject. My wish is to draw your attention to those principles which should, in my opinion, regulate and underlie all purely decorative work, when applied to forms and surfaces which, whether they appertain to buildings or to movable objects, made by the hand of man, are not presentations of natural objects.

Unlike the works of Nature, the things which man invents and constructs for his own use have their design based upon simple geometrical forms, and, in the majority of instances, these are in some direction symmetrical.

In all parts of a building and in a vast number of other products of man's invention, stability is the first requirement, and precisely in the degree to which this condition is important to the structure is it important also that any color, used decoratively on that structure, should assist and confirm the idea of stability or of strength.

In considering the lessons to be derived from Nature in the matter of decorative coloring, we must never lose sight of the great distinction between the forms to be colored. In the case of Nature we may almost say that the forms to which beautiful coloring has been applied are never simple geometrical forms and rarely have stability as a characteristic. Nature is always moving, always presupposes motion. Animals, birds, insects, foliage, flowers, these are the objects on which her most exquisite harmonies are lavished. All move, either actively of their own volition, or passively, by the action of wind or wave. If, therefore, we may seek in them instruction in the combination of harmonious colors, as we undoubtedly may, we must not look to them for instruction in the distribution and arrangement of color upon objects and structures which are intended to be immovable. We can follow them in coloring a fan, not in coloring a dome.

I lay stress on this distinction at starting, because I strongly advocate constant recourse to Nature, and to reap advantage from her teaching, you must beware against misapplying it. Moreover, the true lessons to be derived from natural objects are not to be fully learned from those objects detached from their natural accessories or surroundings. Something may be so learned, yet it is but a fraction of the whole, a word or two out of the poem.

We may certainly go pretty directly to Nature for lessons in one form of decorative art — I mean the art of dress — so far as the distribution and harmony of color are concerned. I do not know to what extent the fashionable dressmakers make it a practice to study the combinations of color in flowers, birds and other living things, but I am quite sure that they can go to no better school, and I feel pretty sure that the most artistic designers of women's attire draw their best inspirations from these sources. After making the necessary allowance for complexion and other special circumstances, there is considerable resemblance in the conditions which would regulate the arrangement of color in a lady's dress to those which are found in the plumage of birds. There are the same easy curves, the same variety of attitude, which render geometrical or very regular and symmetrical division unsuitable, and which, on the contrary, invite irregular forms, with the occasional piquancy of a suddenly accentuated contrast. In graceful movement or in graceful repose there is no symmetrical arrangement of the limbs nor of the curves of the human body, nor, indeed, in animal form of any kind. Hence, those surface divisions of color are best which are independent of any one attitude, which, in fact, are not liable to distortion by each change of position.

But how different is every condition when we come to deal with a solid and inanimate structure. It is difficult to follow the rapid and, to a great extent, unconscious workings of the mind in matters of taste and in the exercise of the critical faculties, difficult to distinguish what is due to discrimination and what to association with some previous experiences. But there is one circumstance indispensable to the enjoyment of the beauty of any work of art. It is this: The mind must have no doubt, no misgiving, as to the object's stability; to that extent the mind must be satisfied at a glance. That amount of repose attained, it will (unconsciously) seek knowledge of the general form and outline, and only after that will it settle into such a reposeful condition as to allow of the examination and enjoyment of detail. So long as any perplexity remains, the sense of duty will be dormant, or nearly so, where the handiwork of man is concerned. Man must understand his brother man's work, or it troubles him. Now, it is just at this point that color comes in with a few words of rapid explanation — if properly used. Color will explain form at first sight (if used to that end), with a clearness and rapidity quite unattainable by form alone, and especially by form alone in a diffused light.

The reason why the exterior of a building is comparatively independent of color for the expression of its proportion and of its structural lines is that the stronger and more direct effects of light at once throw into relief the salient features. It is the reduced and diffused light of the interior which renders the explanatory help of color so valuable, I was going to say indispensable. True, color serves other and less simple ends, but that is its first purpose, and to so use it as to explain simply and effectively the structure and proportion of the interior, and the direction and nature of its surfaces, whether plane or curved, convex or concave, is the first duty of the architectural colorist.

Be the ultimate object the richest splendor, the most elegant elaboration, or the most austere simplicity, the first consideration in the use of color to any interior, or to any part of a building, must be that it shall assist and in no way confuse that sense of repose which comes of a prompt recognition of its main forms and structural lines.

Now, before proceeding to consider by what methods this object may be accomplished, I will here just anticipate a comment which will no doubt have occurred to many of you on this postulate. "This may be true," you say, "of such buildings as have architectural expression and structural features to deal with, but what of the numberless interiors and structures which have no such features and no such expression?"

To this I reply that, so far as the want of such expression is perceptible, the colorist's first aim in treating such structures must be to offer such a substitute as will afford the same mental repose. In other words, he will so distribute his color that the forms brought into prominence may assist the idea of stability and go to counteract any sense of apparent weakness or confusion.

It is, however, more convenient to deal first with that part of the subject which relates to buildings having defined structural expression. Now such buildings vary immensely in the extent to which they may be said to rely on their architectural detail for effect, or to be dependent on color. Broadly speaking, one may say, "the more moulded surface the less color," and the greater the necessity for extreme care in its use. In an interior which is already elaborately treated by the architect with mouldings and carving and the surfaces subdivided into panels, simple "explanation" must be the aim. To distinguish the really important structural features from the mere subdivision of intermediate space, and to do this without detaching them, is the first object. There must be the same sort of relation between the major and minor structural lines that there is between the trunk and its branches.

Take the case of a vaulted hall or church, with arches and vaulting springing from piers or columns. A relationship must be maintained (whatever the extent or scale of color), not only between piers, architraves, cornices and archivolts, but between these and such minor divisional features as subdivide the surfaces between them. Subdued in tone these last may be, but not removed nor sharply contrasted. The broad contrasts must be between the structural forms generally and the spaces or surfaces between them, whilst the sharper, more vigorous relief of color must be within the limits of and expressing the direction of the structural features themselves.

But, again, there are many buildings which, having the same main constructive features as that which we have been considering, have no such minor or secondary moulded divisions. Each bay of the vaulted roof may be a blank surface. We have then to consider what alternatives may be adopted in treating these blank spaces.

First. It may be contemplated to devote them to a decorative

[1] A paper by Mr. John D. Crace, read before the Society of Arts, and published in the *Journal* of the Society.

pictorial treatment, without actual subdivision. This will rarely be quite satisfactory; because any pictorial representation, straying, as it were, over a large area of curved surface, produces some confusion as to the form of the surface, and what is architecturally more important, leaves the structural lines too detached from what they should support—standing in fact like the bare bones of the whole. In such a case, however, this ill effect may be much moderated by interposing, between structure and panel, a band or bordering of such coloring as will, while supporting and spreading out the constructive arch or rib, allie it in some measure with the coloring of the panel.

But, however excellent may be the pictorial work, it will be seen to far more advantage if it be framed and supported by such dividing margins as will serve at once to suggest the contour of the surface, and to limit each pictorial area to such space and form, as can well be seen from one point of view. It is not necessary that these minor dividing bands should represent actual or possible structure. It is sufficient that the major lines of construction are expressed, and that the contour or section of the spaces between is explained by lines which become the equivalent of the minor construction—and suggest the ramification or network of support.

There is yet another type of internal structure, which may be founded upon the same general lines as those we have just considered, but is divested almost entirely of mouldings, or moulded relief. Such buildings are dependent for their effect entirely on their colored decoration, and are, perhaps, so built with the express object of affording scope for such treatment. Firmly expressed lines, and borders of color, take the place of mouldings; and these must have sufficient force to make clear the structure, and to define the limits of the several areas of surface.

It is upon interiors of this last type that mosaic decoration may be most advantageously employed. This magnificent method of decoration by color does not accord well with the use of mouldings, except to the most limited extent. Its nature demands exceptionally bold treatment, and the very strength and brilliance of its effects destroy all perception of the delicate shadows and roundings of good mouldings. It demands large surfaces, and is most effective where the surfaces are curved, these affording that variety of angle to the light which gives such splendor of effect to the gold grounds. It is under such conditions that mosaic is used in St. Mark's, at Venice; in the churches at Ravenna; and in many other of the best examples.

In the course of the foregoing remarks I have repeatedly spoken of the need of lines or division margins to "explain" the contours or planes of large surfaces. It is perhaps necessary to show why they are required, and how they serve the purpose.

It will be obvious to any one who considers the matter that it is only by *its external limits*, or by some indication of shadow or other incident, that we feel at all sure whether any large surface of one tint is perfectly flat, uneven or curved. We can see that a plastered wall is bulged if we look at it edgeways against the sky or against some vertical line; but if we stand facing it, and the light be diffused (that is to say, if there be no cast shadow), we can form no true opinion as to whether the wall is a true plane, or bulged and out of upright. But if, instead of being plastered, it be a brick or stone wall, with straight horizontal courses, every joint of which is above or below the sight-line will at once betray the curve of the bulge, and will indicate whether it be convex or concave. These horizontal joints will not, however, tell us whether the wall leans bodily in or out, or is "hollow" from top to bottom; we must look for some continuous vertical joint, or to some door or window opening, to betray this. We must, in fact, have the means of comparison, which a straight line, or a line of known direction, will afford.

Now let us see how this applies in decoration. We will take a feature over the treatment of which there has been much discussion during the last few years—the "cupola" or interior of the dome. Suppose that we are standing under and looking up into a plain undecorated cupola, what do we know at a glance as to its form? What remains in doubt?

Well, we know, at once, that it is circular in plan; we learn that from the cornice, from which it springs; but beyond that, and some chance indication that its vertical section is curved we know nothing. Whether that vertical curve is high or low, elliptical, semi-circular, or segmental we do not know, and cannot so much as guess, until, by dropping a series of vertical lines on its surface, we exhibit its vertical section. Then doubt disappears, and the eye, relieved from perplexity, and satisfied as to the stability of the vault, soars up the curved line, grasping the whole meaning of the noble form, and ranges tranquilly among such detail as may occupy its surface.

Now, as the cupola is explained by these vertical lines, so is a barrel vault explained by the archivolts which divide it into bays, and by the other framing lines between them, whether they be in color or in relief only. So groined vaulting is explained by its ribs; and where the builder has already provided such explanation, the decorator must confirm it; where it does not exist, he must supply it.

Let us now consider what is to guide the colorist in dealing with interiors which have no structural features to emphasize; which in fact, cannot be regarded as architecture at all. If such be of a size and for a use, which seem to call for some attempt at imparting dignity to its effect, it will probably be desirable to suggest, by the decoration, some structural division. In some cases the addition of a frieze will establish more agreeable relations between the walls and ceiling; in others some vertical division of the walls—which may form points of departure for division of the ceiling—may greatly enhance the dignity, and improve the proportion of a plain room. In any case, if there be any strength of color in the ceiling, there should be, at some points, strength of color leading up to it. In rooms for domestic use these are often practically supplied by the window hangings, and in the majority of such rooms the dimensions are so limited that the want of constructive features is not felt.

And it may here be remarked that one very broad distinction divides most domestic interiors from those which are intended for some public or special use, when the question of colored decoration arises. In the latter there are no draperies, nor carpets, nor any of those accessories, such as furniture, which all play so important a part in the coloring of a private house. Consequently, in the absence of these, the decorative coloring of the building itself has to be more complete, its harmony more carefully balanced, more thought out as to the purpose and result of each tone used. The absence of the accessories of a house, with all their variety and irregularity, leaves the coloring of the building more exposed to view and more directly challenging criticism. A firmer, surer, and more purposeful hand is needed for the coloring of a bare public building than will serve for the domestic interior, in which picturesque arrangement, suggestions of historical association or foreign travel, or the collector's taste, may often play a more important part than either architecture or decorative color. Nevertheless, much may be done, even in a room of moderate size, to improve or make the best of its proportions, and to impart an interest to it, as a whole, by the distribution and management of the color. The flat ceiling which, being the largest unbroken surface in the room, always has a tendency to appear weak, may be lifted and supported by the lines or grounds of color which form the framework of its ornamentation, being so arranged as to throw strength into the sides and angles; and these leading forms and lines may themselves be made interesting and suggestive by their combinations of curve or angle. It is a common error to suppose that color will "bring down" a ceiling. This will only happen where the tones are too strong or too crude for those which occur on the walls and in the draperies. All ornament must be kept subordinate in strength of contrast to the tones of the framework or controlling lines. If this be neglected, a sense of confusion will mar the effect, and destroy the repose essential to success.

The use of polychromy for external decoration demands very careful attention; and the extent to which it is desirable, as well as the best methods for its exercise, have been much debated during the last thirty years.

I would venture to say on this subject, that, in a building which has any pretence to architectural design, the polychromy of its structural features should be confined to that presented by its constructive materials. Yet even such buildings present occasionally features or surfaces which may be so treated in color (whether by mosaic, or even by the painter), as greatly to enhance the effect and value of the whole. I could point to numerous examples, both ancient and modern, of the successful use of color in this way. Of modern instances, I may quote the great frescos outside the Berlin Museum, where color is used pictorially; or the merely ornamental coloring of the window reveals in the Chateau de Blois; or, again, the very skilful introduction of mosaic ornament in the brickwork of the Trocadèro at Paris, all of which must, I think, be admitted to contribute largely to the effect and value of the buildings themselves.

But there is another class of building, of which we have only too many examples here, which afford occasional opportunity for some amount of color treatment. I mean the stucco-fronted houses, in which design can hardly be said to have a place. Their "architectural symptoms" are of the slightest, and they, in any case, have to be painted in some way, periodically, to preserve them from decay. Here there would seem to be a fair field for careful schemes of color, and I have observed a few very able instances of the external treatment of such buildings. Certainly, there is a growing taste for some application of color to such houses, even where they are private residences. One such residence near me has recently had its ground story (including the front door and area railings) painted the color of red sealing-wax. After this, I feel that it is not timidity that restrains us in this matter. What we seem to want is judgment—a knowledge of how to compensate, by simple means, for the want of beauty and interest in the structural form.

There is, again, the detached villa, which, being less prominently exposed to public view, might often be made a much more attractive and more refined looking building, and be brought into better harmony with its small pleasure garden by a little skilful coloring than it is when its stucco surface is left with the usual two coats of "light stone color." Many a small suburban house in the outskirts of Paris has so been treated, with the result of presenting as much outward charm as if many hundred pounds had been lavished on architectural refinement.

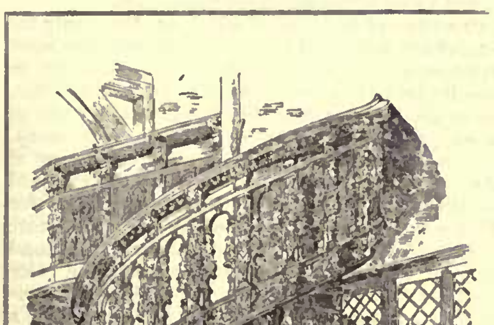
True, it is not so permanent; but is our lease-hold tenure so permanent as to offer much inducement to us to spend money on permanent adornment? The great majority of us think ourselves lucky if our interest in the house we live in extends to 20 or 30 years; at the end of which time our ground landlord swoops down on us with a bill of dilapidations, with an extra rent-charge, and probably a demand for premium based on our own improvements. It is quite a question whether the house will last another such term; for it must be admitted that, however charming, your stucco villa is not a very long-lived piece of work. Not that I join in the abuse of stucco, for

under the short-lease system you probably get a better and more weather-tight house for your money, if it be of the modest "stuccoed" order, than if you attempt one, at the same rent, in sculptured free-stone or ornamental brick. Only it is better to treat it as stucco, and to do your best with the paint-pot, than to make believe it has a noble stone frontage.

The same general rules which should regulate the distribution of colored form on parts of a building apply, with reasonable modifications, to smaller objects. Take pottery: if a vase or cup has a graceful contour, it is obviously desirable that any variety of color used in its decoration should assist in showing its form, not disguise it. Very beautiful art is often expended on such articles with the result of actually detracting from their beauty of outline. I am not speaking of modern English pottery in particular. It is a mistake common enough in the finest manufacture of other countries, and it seems to me a quite unnecessary mistake. Of course, very exquisite painting will charm, even when used to poor advantage, but its merit of execution does not altogether justify its misapplication. In our own time and in our country, it is a great misfortune that all our best artists learn to paint for a gilt frame alone, and are, for the most part, absolutely untrained in thinking out their subjects for any other application. I cannot but think that in this matter our Royal Academy of Arts might effect much reform, and give an impetus to the artistic excellence of the productions of this country, if, from time to time, they admitted to their exhibitions some proportion of objects of applied art of a high standard. It would encourage the best men to throw some, at least, of their best work into branches of art that can never rise to the highest level unless they draw to their service the best men. It was these branches of art that went to build up the fame of the greatest artists that the world has known; and I confess to the opinion that, so long as our highest art training has no other object than the production of detached pictures, destined to no special purpose or position, painted to no requirement, having for object chiefly to catch the eye of the buyer, so long the standard of art will drift right or left, to this or that particular fashion of excellence; but, being without purpose, will never attain to any very noble rank.

I am afraid that my discourse to-night may provoke the criticism that, being "on the use of color," it has mentioned no single color, has suggested no harmonies, has indicated no contrasts. I must plead that these omissions were intentional, not because I think these things in themselves less important than the matter I have spoken of, but that they are now frequently and ably treated, and are daily better understood. I was desirous so to limit my subject as not to divert attention from my main proposition, which is, that whatever the tones of color employed, whatever the scale of harmony, no "decorative use of color" can be really successful which is not based on the intention to do the best possible for the thing decorated. And then I go a little farther, and say that no art can really attain the highest excellence if it has no broad purpose, no alliance with its sister arts. The art which is shut up in itself, whose masters have neither trained knowledge of, nor sympathy for, its allies, whether humble or noble, can never be progressive. In art, as in life, man's noblest work is most often produced in the earnest effort to ennoble and complete the work of others.

COLOR OF FURNITURE.



In the Jakobkirche, Lubeck.

OUR engrossment with art is more general than was the case with the men of the Renaissance whom we copy. Where there was then an active corps of patrons and artists, a world of producers and consumers now engage in the work of resuscitation, so that an account of the present movement will make a page of popular histories and not alone of biography or the development of art. It is to be wondered at, since this is the case, that the movement has kept so wholly within, or rather along practical historic lines. The large element of laymanism in it would seem to justify the expectation among other things of phantasy — I do not mean of productive fancy, but of contemplative observation. The literature of the period shows the Cinque Cento and the sixteenth century as having it. Along with the text-books of Alberti, Palladio and du Cerceau existed Simon Portius's and innumerable *de mirabili potestate artis*.

Perhaps we shall come to it. Coming a short way towards it would not, I think, be undesirable. After accepting the material, imitating and emulating the designs of the past to fulness, we may brood over the inner spirit of our surroundings as the past brooded on hers. The step is near and natural. Taste in the first degree is refinement of sensations, but we have taste often in the second and third degrees, or as habit of sensation. Phantasy may be useful here in making out of routine a way into new alertness of perception.

Take the color of our rooms as an instance. What have we thought upon this subject beyond the fact that subdued tones are agreeable? That they are suitable to our climate, which furnishes enough light to enliven them, and are of especial benefaction to the nervous American race by reason of their quieting influence? Such reflection is already speculative, but there are further steps in speculation that bring us beyond general theories to attentive reflection upon the color and tone of our houses as a whole and of each room in particular. No less an authority than Goethe has touched the subject (Goethe, to be sure, does not bring forward the matter as speculation, but calls it experience). "Experience," he remarks in *Zur Farbenlehre*, "teaches that each color incites its own peculiar mode of feeling. It is told of a clever Frenchman that he maintained the tone of conversation at Mme. —— had changed since she had changed to crimson the color of the furniture in her cabinet that had been blue. Among colors, yellow embodies light when in its clearest purity, and possesses a cheerful, charming, encouraging and gentle property. It is agreeable as a surrounding, whether as dress, drapery or carpets. Gold gives a new and exalted idea of the color, especially when it is polished. A brilliant yellow against shimmering silk or satin produces a peculiarly noble and splendid effect."

It did not lie in Goethe's line of reflection, else he might have added that we find an historical proof of these definitions. For at the period when society reached in France a height of social refinement such as it never attained elsewhere, not even in Italy, by reason of the inferior influence of the womanly element in Southern society, the color used for ante-rooms and salons of reception was almost invariably yellow — yellow in pure shades or enlivened into amber. "All that has been said of yellow," our author continues, "is true of reddish yellow, only in an increased degree. Reddish yellow incites a feeling of warmth and blissfulness. Red transfused with yellow, on the other hand, has something powerful and raw. It is no wonder that energetic, healthy, rough people like it. That savages have a preference for it has been often noticed, and children, if left to themselves with a box of paints, are not economical in the use of red lead and cinnabar. One needs only to stare at a spot of perfect yellowish red to find that it bores, as it were, into the optic nerve. It excites an almost incredible effect. Animals are made uneasy and almost maddened by yellowish-red cloths, and I have known persons who could scarcely control themselves if, on an overcast day, a man came in sight with a scarlet jacket on."

This color is banished from our houses. The only reminder of its primitive use as an excitant is found as curtains at bar-rooms. If refined Orientals still continue its use, as is the case in Constantinople, we have to reflect that the intensity of Eastern sunlight casts a glow and reflection on all surrounding colors, materially modifying its single effect.

Goethe found blue to have something dark in it of an indescribable influence. We like to look at blue as we like looking at a distant landscape that seems ever to withdraw as we approach, not because blue intrudes upon our sight, but because it draws us after itself. Blue conveys the same feeling of coolness that a shadow does. Rooms that are papered in blue appear comparatively spacious, but rather empty and cold. There is an appropriateness in this color for such society rooms where the toilettes, the rosy hues of flesh, sparkles of eyes and flashes of teeth, jewels and gaslights are to be raised; for bed-rooms in summer cottages; for garden-houses where respite from society and from heat are sought.

"Red conveys an impression of earnestness and dignity, as well as of condescension and grace," it is remarked further, "the first-mentioned effects being produced by its sobered, darkened hues, and the last by its light masses. History has much to say of the jealousy of monarchs over purple. Surroundings of this color are always dignified and magnificent." Red is proper for entrances to palaces and for apartments of state, and, in conjunction with other colors, for parlors.

The implication of the Parisian wit was to the effect that whereas conversation at Mme. —— had been reserved, it became warm; indeed, as the change of color of the room was to crimson, he probably even meant *distastefully* warm, a French prejudice existing against this shade of red as a typically repulsive degree.[1]

Green is peculiarly quieting and gratifying to the eye. Goethe found a tendency among his countrymen to choose this color for sitting-rooms. It is perhaps the best tone for the sleeping-chambers of the old as rose-color is for those of the young. As a matter of fact, our rooms are mostly of mixed colors, but a tone, nevertheless,

[1] The French say for excessively homely, *laid en cramoisi*; for besotten silliness, *sot en cramoisi*; for villianous, *méchant en cramoisi*, etc.

prevails, which might be tested with advantage, perhaps, according to these ideas.

THE ILLUSTRATIONS

[*Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.*]

VIEW OF THE NEW PUBLIC LIBRARY, BOSTON, MASS. MESSRS. MCKIM, MEAD & WHITE, ARCHITECTS, NEW YORK, N. Y.

[Gelatine Print issued only with Gelatine and Imperial editions.]

PLANS, SECTION, INTERIOR COURT-YARD AND INTERIOR OF READING-ROOM OF THE NEW PUBLIC LIBRARY, BOSTON, MASS. MESSRS. MCKIM, MEAD & WHITE, ARCHITECTS, NEW YORK, N. Y.

THE site upon which this building will stand lies in Copley Square in the Back Bay district. The material selected for the building is Milford granite, the color of which is warm and attractive.

Flanking the central arched doorway are carved granite seats, with groups of sculpture on the two sides representing the Arts and Sciences, and with single figures at the threshold representing Philosophy and History. When the visitor enters by this doorway he will find himself first in a spacious vestibule of stone, 55 feet long and 16 wide, and then in a grand entrance-hall of marble, 37 by 44 feet in size. The main staircase, which leads upward from the first floor (a floor given up to the uses of the working departments of the library) is to be of the finest Sicilian marble, the steps being 20 feet long. On the second floor is found the reading-room, which takes up the entire frontage, its size being 42 feet by 218, with a height of 50 feet, and a barrel-vault roof. The woodwork of this magnificent apartment is to be of oak, wainscotted from the oak floor to the base of the great arched windows, a distance of 14 feet, while at the two ends of the long room are small arched spaces cut off from the main room by means of carved oak screens. For the storage of the vast collection of books space is found in that side of the building that lies parallel with the front and in one-half of each of the two remaining sides. The entire space in these parts of the building, from the ground-floor upward, is given up to the shelves, which are arranged in six stories, each 7½ feet high.

It is estimated that the new building when finished will have cost $1,175,000, and that it will require at least three years to finish it.

THE ROYAL ACADEMY, LONDON.

Church near Meiningen. From Arkitektonische Rundschau.

THE Academicians may be congratulated upon one reform which they have carried out in this year's exhibition, the practical limiting of most artists to one picture. Many years ago I suggested to the late Tom Taylor that this ought to be done here in London, and that if men like Meissonier and Gérôme could gain their reputation by exhibiting only two pictures at the *Salon*, we in England ought to be able to do the same, and consequently that our governing bodies should adopt this practice. Mr. Taylor made the suggestion public in the *Times*, *apropos*, I think, of the Dudley Gallery; at all events the Dudley of those days was the first to set the fashion. The Academy has never formally made any rule of this kind, but it has this year acted upon it indirectly, for out of 1,350 exhibitors, only half can have more than one picture hung, and as a few Academicians and others still sin by exhibiting four, five and even six and seven, many more than half the 1,350 artists can only have one work upon the walls. Mr. Herkomer has seven portraits, but Mr. Herkomer is a prolific producer. Not only has he painted well nigh a dozen life-size portraits, but he has composed a romantic musical fragment, the "Sorcerers"; he has done a number of sketches around his Bushey home, and has superintended his school, stage-managed his "fragment," lectured and acted. This would seem for most men to be enough for several years' work, but Mr. Herkomer is industrious and does not let the grass grow under his feet. Still, being human, perhaps it would be wiser were he to do less, or rather, attempt fewer things, for certainly his portraits are not nearly so good this year as they were two years ago. There is a want of care which comes of attempting too much, and some of his work might, without irreverence, be called slovenly.

Mr. W. B. Richmond's "Prince von Bismarck" is a *tour de force* if it be true that the chancellor only sat once for the picture, but it is an unpleasant portrait of a repulsive individual. Far more agreeable and infinitely better painted is "Viscountess Hood" by the same artist, a noble portrait, and were it not so thoroughly a reproduction of Sir Joshua's "Mrs. Siddons as the Tragic Muse," it would be still more commendable. It is a pity Mr. Richmond does not depend upon himself for his composition; last year Lord Pembroke appeared as an echo of Murello; this year we have the shadow of a Reynolds; who will be the next?

Mr. Yeend King has three charming landscapes of sunny effects of trees and water, and Mr. Henry Moore's "Nearing the Needles" is an exquisite study of a stormy sea after a gale, when the coast is lighted up by sunshine, while the water remains angry and dark. Mr. Arthur Hacker has a very good portrait, but perhaps the best in the exhibition is M. Carolus-Duran's of Professor Pasteur. Full of vigorous but subtle painting, this head stands out amongst an unusual number of good portraits. When M. Carolus-Duran is at his best, who is equal to him? and if the lady's portrait, the "Countess of Rico," is not one of his best, it is not the painter's fault, for the only natural part of the picture, the red velvet dress, is superbly treated. A woman who paints and powders herself cannot expect a painter to give her a complexion.

M. Gérôme's "Barde noir" is hard and lifeless, although the accessories are well painted, but M. Gérôme's style is quite out of date, and we turn to Mr. Henry Woods' work with pleasure. This painter's "Saluting the Cardinal" is a brilliant piece of coloring, and one or two other corners of Venice, where Mr. Woods lives, are equally crisp and sunny. Mr. Frank Holl may be said to be as usual; many masculine portraits, masculine both as regards the sex of the sitter and the character of the work. So, too, Sir Frederick Leighton's "Captive Andromache" is as usual, refined, well-composed and ideal; it cannot fail to be attractive, but it is purely decorative in treatment and the painting is waxy and somewhat crude in color. Still, the president is the only English painter who ever attacks such subjects with any sort of success.

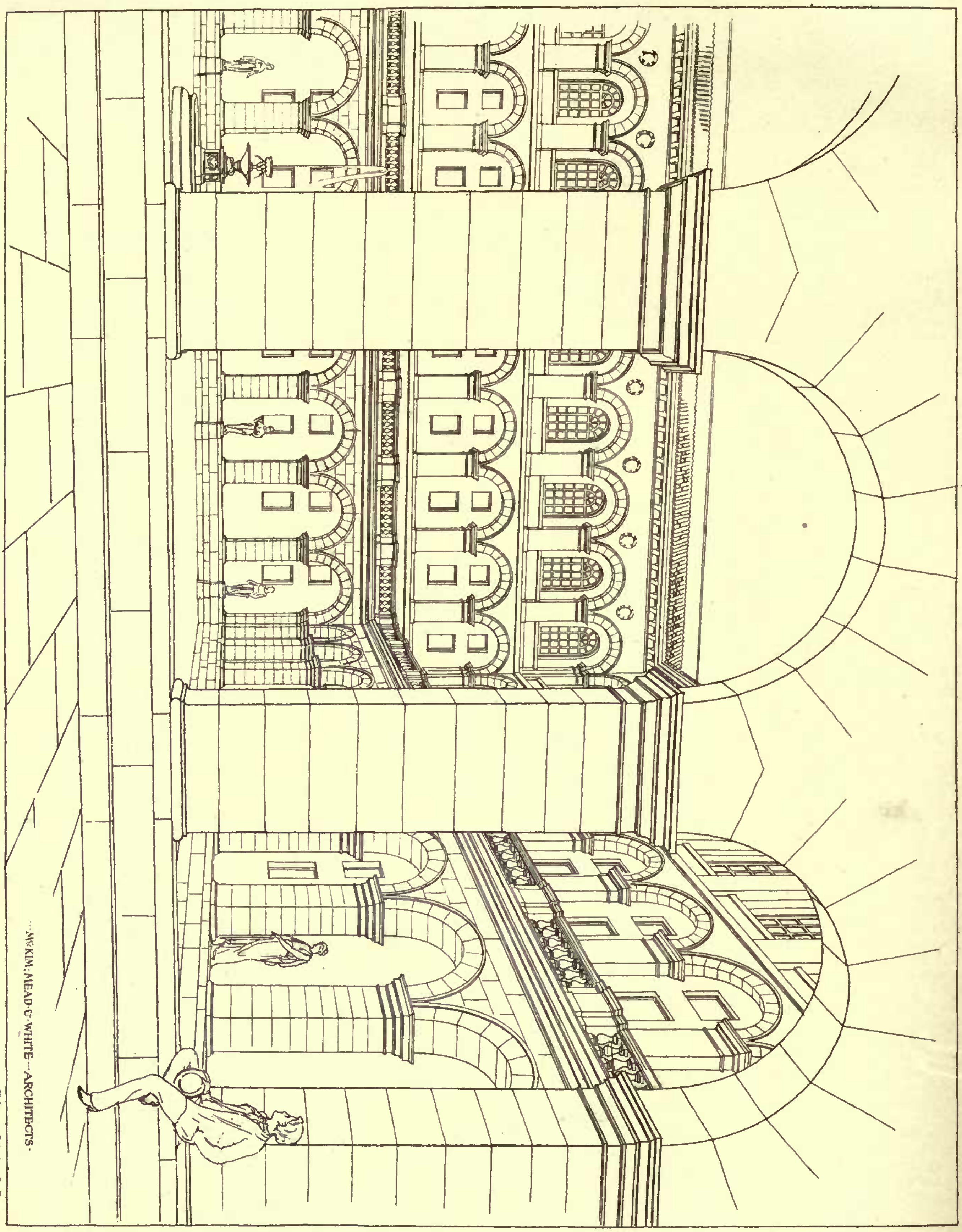
Mr. F. Goodall has lately gone in for religious painting and he and Mr. Herbert divide the honors between them. Both occupy a considerable amount of wall-space, which might be better filled by more modest productions; indeed, so thoroughly unreligious is its tone that indeed were one to look for long at Mr. Goodall's "Sea of Galilee," I fear the result would be vigorous agnosticism.

Mr. Orchardson is always great in execution, however commonplace his subjects may be, and could I take upon me any painter's mantle, I think it would be his. "Her Mother's Voice" is charming as a whole, although the girl is anything but pretty. But the attitude of the father thoughtfully listening to his daughter, and the young man standing by the piano are excellent studies. How many painters besides Mr. Orchardson could bring out that young fellow's face against the light wall? If this picture is well put together, no one will charge Mr. Alma-Tadema with paying too much attention to composition. Bit by bit, what splendid painting it is, and what masterly drawing! How could Mr. Tadema do anything, which, as *technique* is not perfection? But as a whole, the picture, "The Roses of Heliogabalus" is very unsatisfactory; it is confused and wanting in repose. Sir John Millais's "Murtly Moss," perhaps, sins in the opposite direction; equally wanting in effective treatment, it is too reposeful, having no leading point; it is, as it were, a bit of country cut out of a panorama. A monotonous sky, a weak distance and a monotonous foreground.

One of the most pathetic pictures in the galleries is Mr. Frank Bramley's "Hopeless Dawn," a poor attic, an old woman, a girl laying her head in her mother's lap, a sputtering candle, dawn breaking through the window, showing a rough sea beyond — such are the elements composing a picture to which are attached some words of Mr. Ruskin's: "Human effort and sorrow going on perpetually from age to age, waves rolling forever, and winds moaning and faithful hearts wasting and sickening forever, and brave lives dashed away about the rattling, beach-like weeds forever." Such is the lot of the mass of struggling human beings who cumber this earth.

Mr. John Sargent has sent a first-rate portrait, Mrs. Henry Marquand, and M. Albert Aubert is welcome in London. His "Turc en prière" is very vigorous. Mr. Long's large work is remarkable. It represents the Egyptian custom of "Judging the Dead." Which are the more wooden and mummy-like, the twenty-four assessors or the mummy-case, it is hard to judge, but as Mr.

COPYRIGHT 1888 BY TICKNOR & CO.



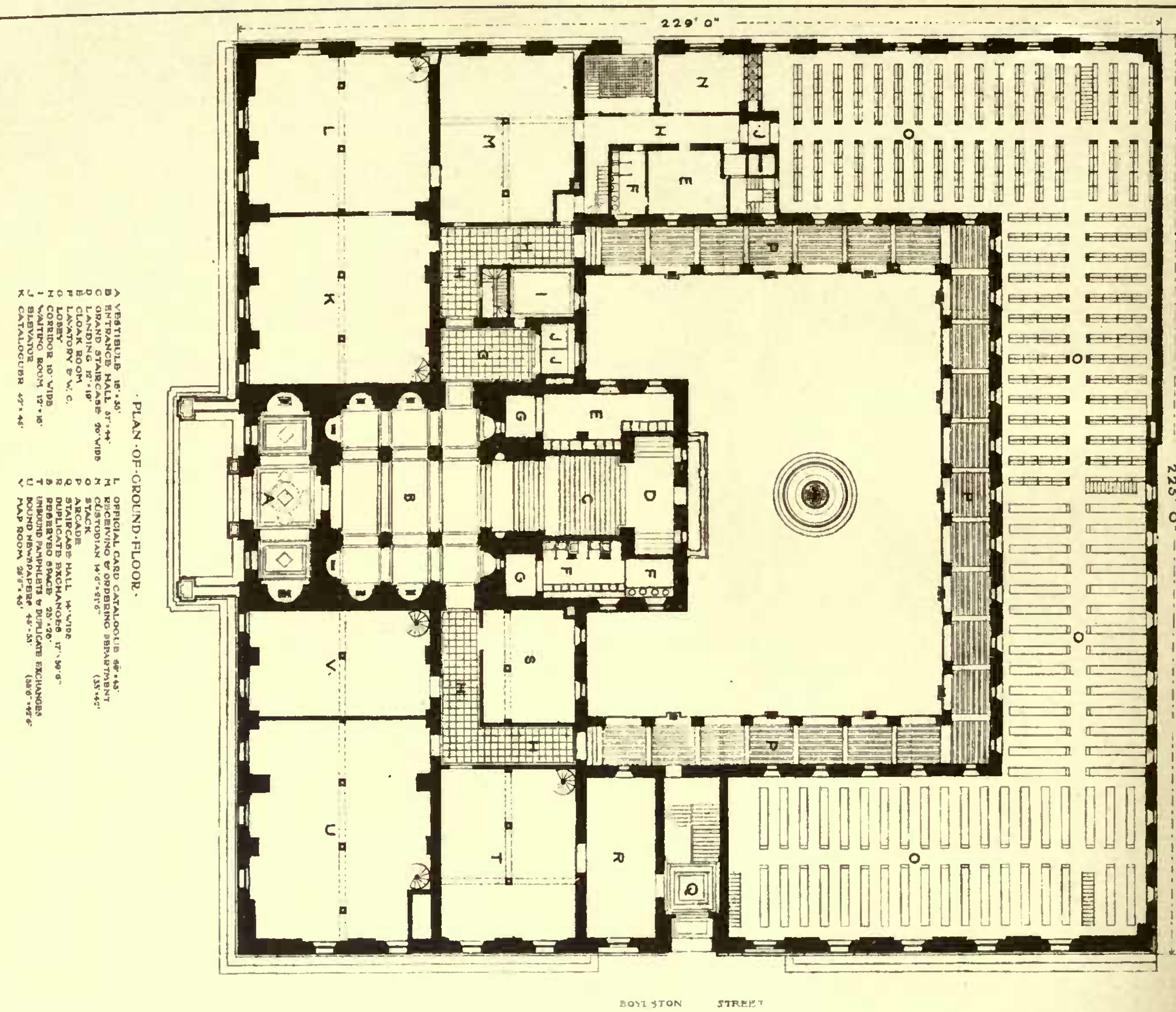
·THE·NEW·PUBLIC·LIBRARY· BOSTON·MASS·

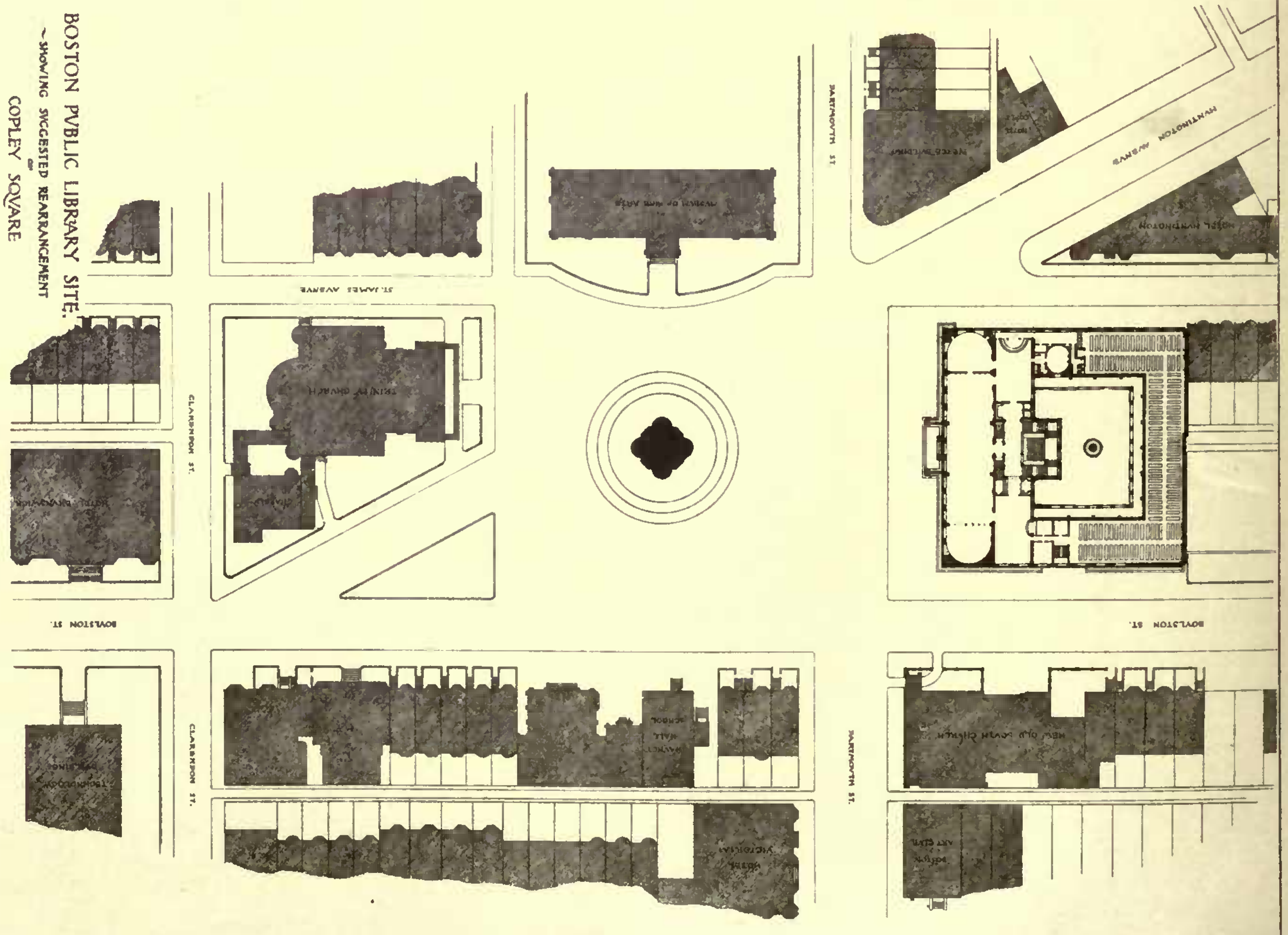
·COURT·(SEEN·FROM·N·W·ARCADE·[100'×135']

·McKIM, MEAD & WHITE··ARCHITECTS·

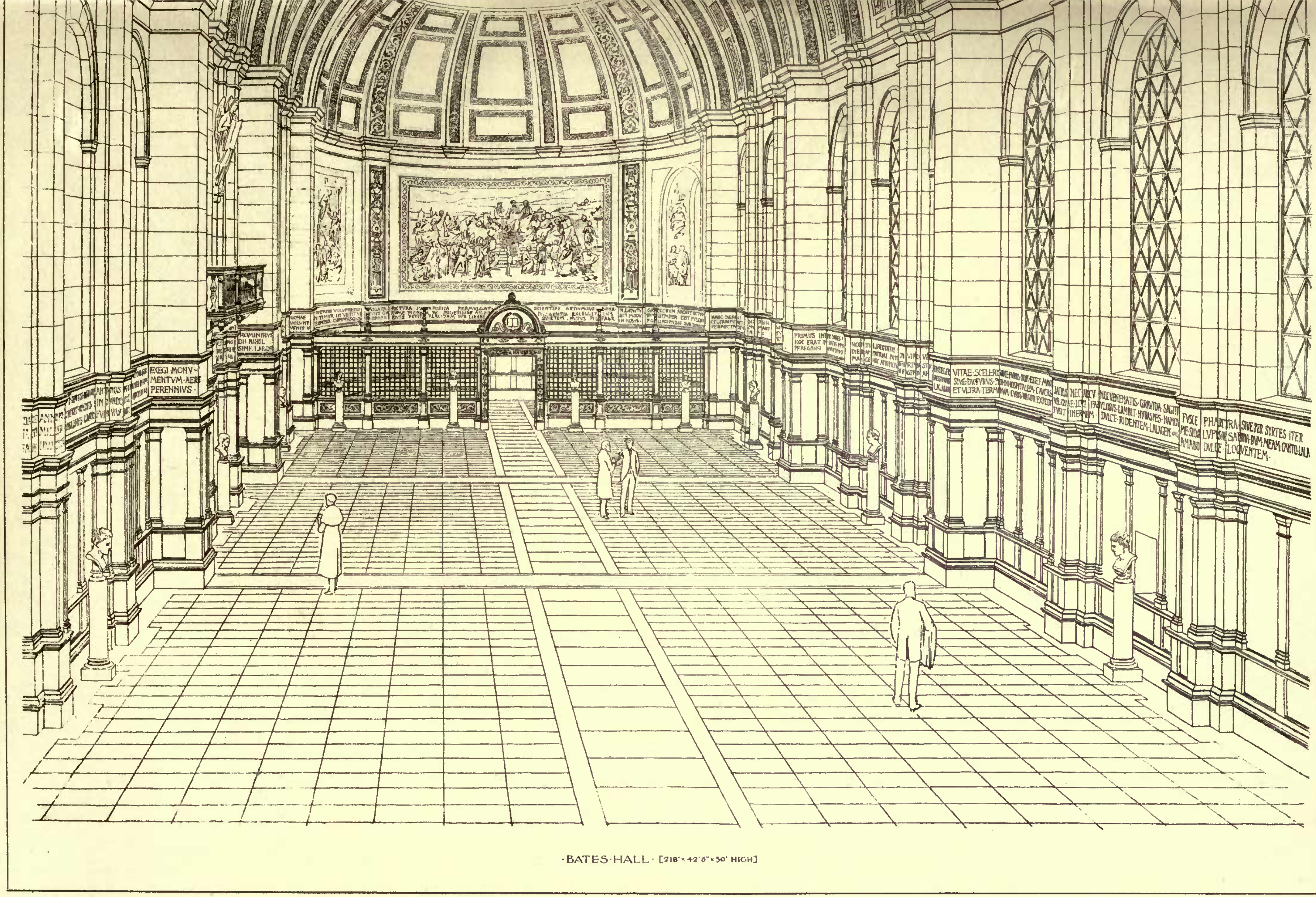
Heliotype Printing Co. Boston.

COPYRIGHT 188





BOSTON PUBLIC LIBRARY SITE:
—SHOWING SUGGESTED REARRANGEMENT OF COPLEY SQUARE



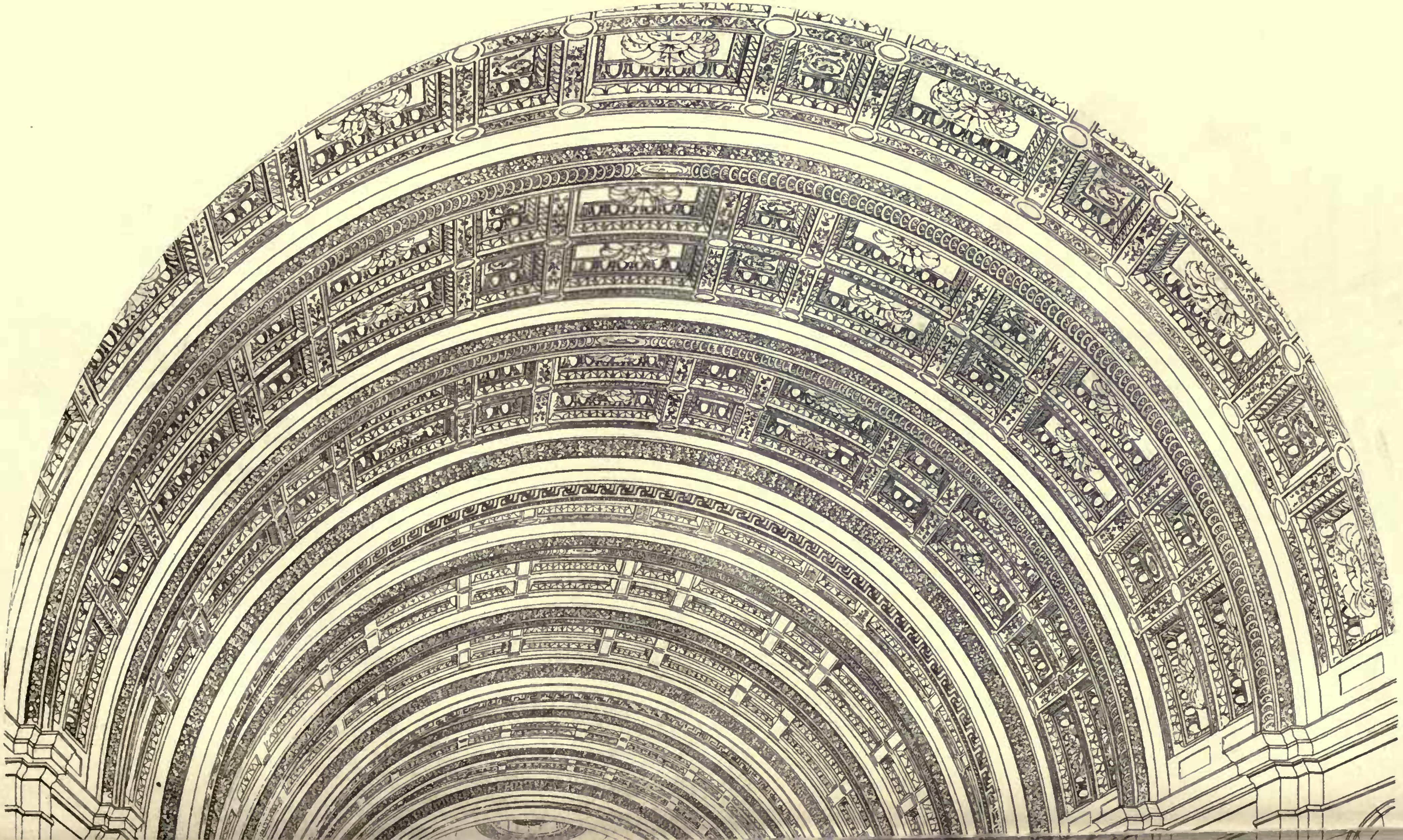
·BATES·HALL· [218'×42'6"×50' HIGH]

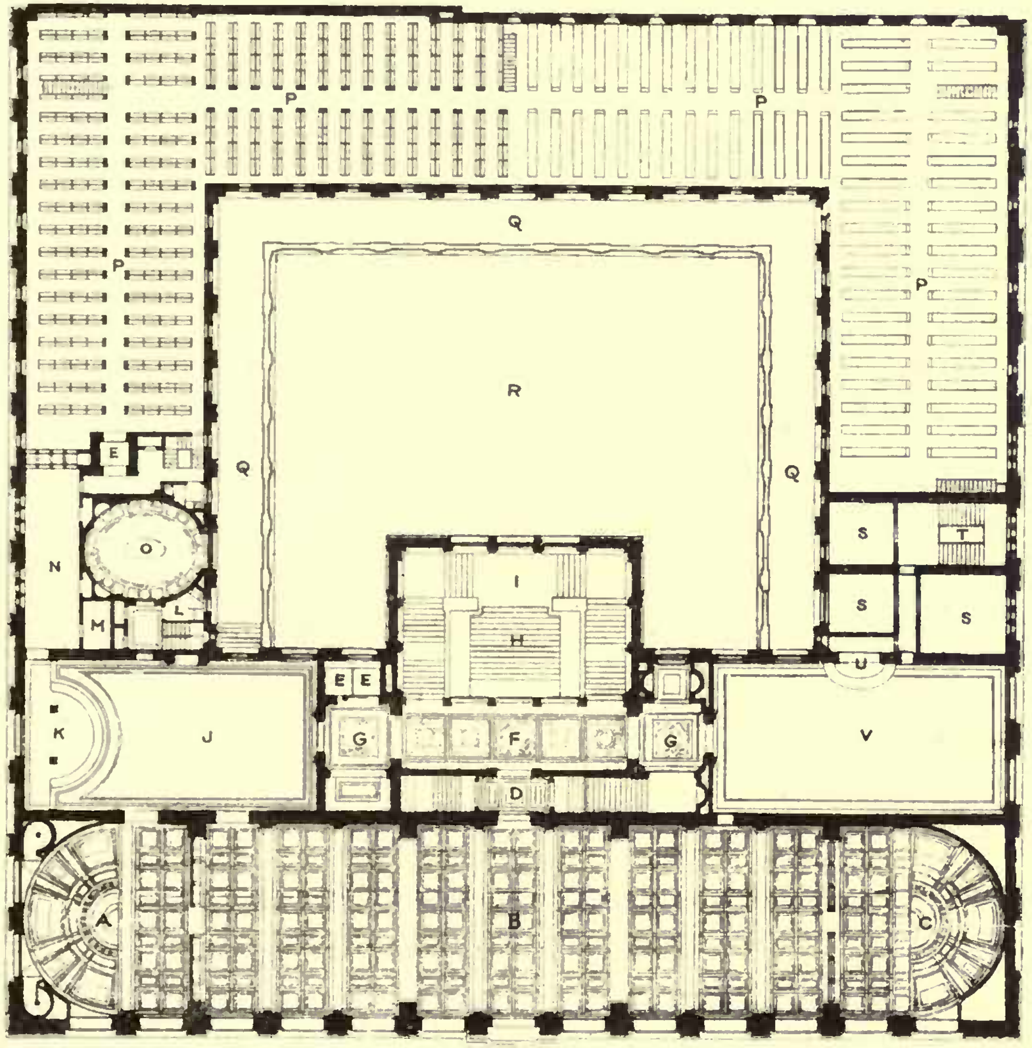
Heliotype Printing Co. Boston.

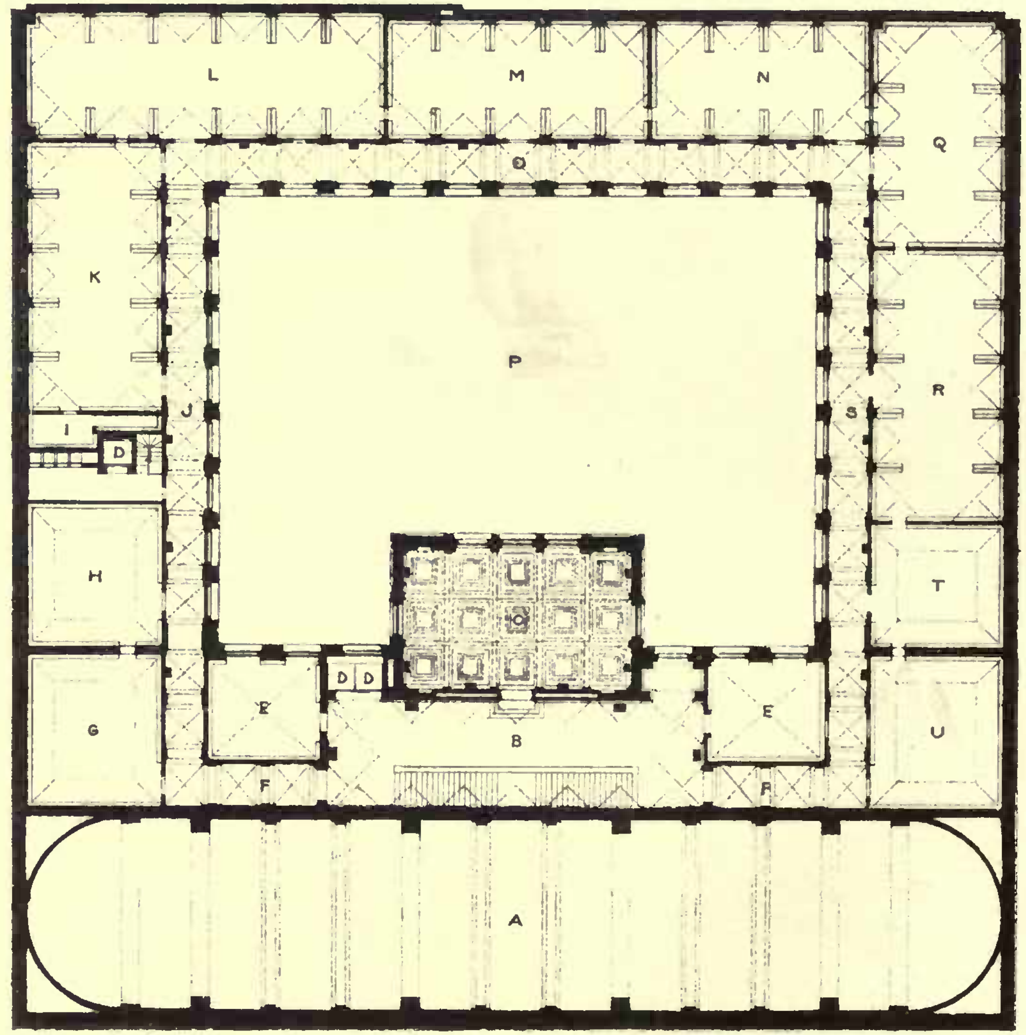
·THE·NEW·PUBLIC·LIBRARY· BOSTON·MASS·

·McKIM, MEAD & WHITE·ARCHITECTS·

COPYRIGHT 1888 BY TICKNOR & Co







· PLAN · OF · READING · ROOM · FLOOR ·

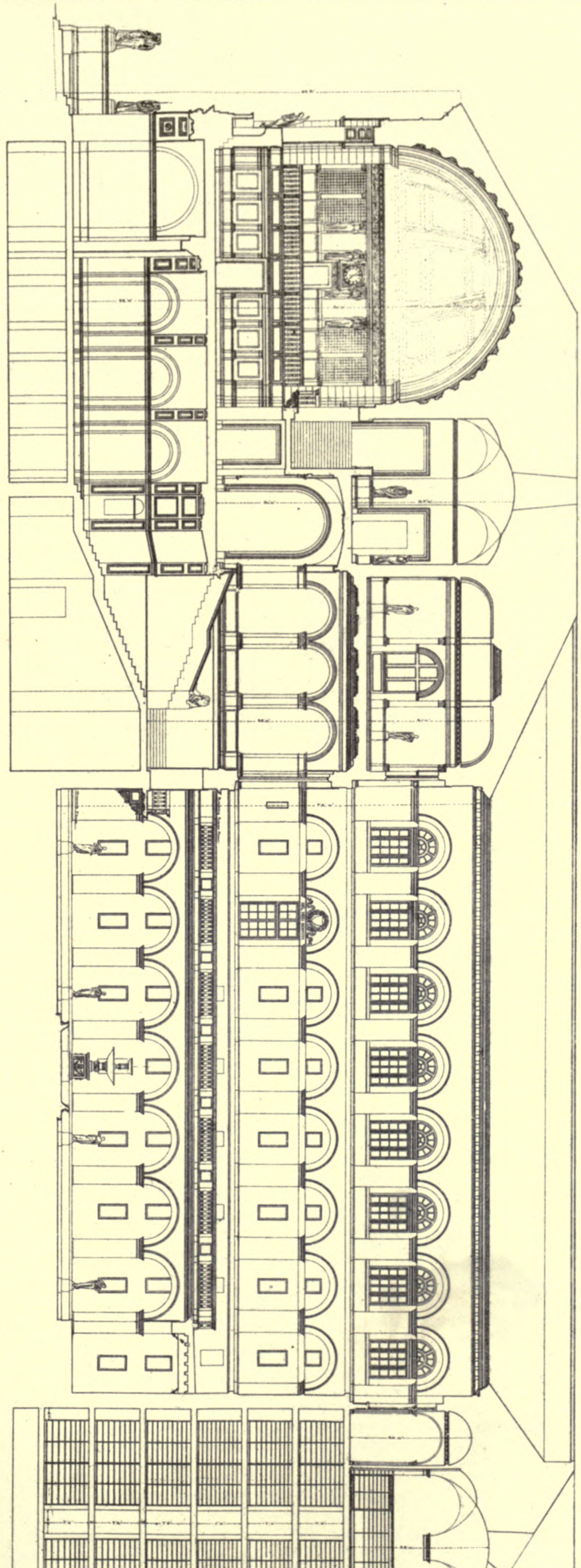
A CARD CATALOGUE
B BATES HALL 42'6" × 218'
C WRITING ROOM
D LOBBY 8' × 10'
E ELEVATOR 5' × 6'6"
F HALL 15' × 30'
G VESTIBULE 16' × 24'
H GRAND STAIRCASE
I LANDING 16' × 19'
J WAITING ROOM 36'6" × 66'
L LAVATORY
M CLOAK CLOSET
N DELIVERY 12'6" × 40'
O TRUSTEES ROOM 23 × 27'
P STACK
Q ARCADE
R COURT
S SPECIAL STUDENTS
T STAIRCASE
U ATTENDANT[S]

· THE · NEW · PUBLIC · LIBRARY ·
BOSTON · MASS ·
· MᶜKIM · MEAD & WHITE — ARCHITECTS ·

· PLAN · OF · SPECIAL · LIBRARY · FLOOR ·

A READING ROOM CONTINUED
B HALL 30' × 64' (22'6" Above floor)
C ART ROOM 31' × 51'
D ELEVATOR 6' × 6'6"
E RESERVED 26'6" × 25'
F EAST GALLERY
G THAYER, NICHOLS & FRANKLIN LIBRARIES 30' × 54'
H TICKNOR LIBRARY 30' × 62'
I SERVICE
K MEDICAL LIBRARY 30' × 66'
L PATENT LIBRARY 38'6" × 70'6"
M BARTON LIBRARY 27' × 56'
N PARKER LIBRARY 27' × 48'6"
O WEST GALLERY 9' × 157'
P COURT
Q AMERICAN PUBLIC DOCUMENTS 30' × 30'6"
R ENGLISH PUBLIC DOCUMENTS 30' × 61'
S NORTH GALLERY 9' × 130'6"

Copyright 1888 by Ticknor & Co



·Longitudinal·Section·

·The·New·Public·Library· Boston·Mass·

...McKim, Mead & White... Architects·

Heliotype Printing Co. Boston.

Long occupies half the wall-space on one side of a room, and his description of this strange practice fills three-fourths of one page of the catalogue, we presume the picture is worthy of much attention. All the same it seems a pity it should not have been shown by itself or with other works of the painter in Bond Street or elsewhere.

Mr. Waterhouse's "Lady of Shalott" is not equal to his "Marianne" of last year, but that does not mean that it is not very superior to an immense amount of work on these walls.

Miss Helen Cridland's "I have a friend, a kinder friend has no man," a waif hugging a mongrel cur, is pathetic. Equally touching is the sadness of a group of cabs and horses standing in snowy, London slush, "Les Misérables" by Mr. Dollman. Mr. Phil Morris ought to go to school again, and Mr. Frank Topham ought never to have left it; let both these gentlemen look at Mr. S. Solomon's "Niobe" and learn how to draw, paint and compose. Really, some of Mr. Morris's work is beneath contempt, but probably his pictures will be eagerly snatched up by the illustrated papers for Christmas numbers. It is impossible to note all the small pictures I have marked and it would not interest readers who will not have the opportunity of seeing them, but there seem to be more than usual this year which are first-rate. Many are the good water-colors, but space compels me to omit mentioning any names.

On the whole, it is one of the best exhibitions I remember at Burlington House, but the English school is dead. All the younger men are French in style, if not Paris taught. For purely English work, I imagine, we shall be obliged this year to journey to the new gallery in Regent St. Formerly, in good work or bad, the style, or rather, the want of style, was the same — young and old all painted alike. Now one sees the old manner represented by the older Academicians and the new style illustrated by the younger generation, that is to say, the Paris schools. Many of these pictures would be quite at home on the walls of the *Salon*. Could we have invented a school (other than that of Mr. Burne-Jones, which is unique, but not all-sufficient), it would have been better, but if we could not learn to paint or to draw, if we could not acquire a style of our own, it is well we have gone to France. The Burne-Jones school is charming in its way, but we want something else, some other style, and this we now have though French in character. Perhaps we may engraft it onto our own insularity — *I* have no desire to retain the latter — and assimilate it, and so form a new style, but in any case I think there is no fear now, as I thought a few years ago, of your painters outdoing ours in the future. Americans saw the wisdom of going to the best school years ago; we English are slower and less ready to seize a new truth. But we are all now in the same boat, and as art is cosmopolitan, let us only be rivals in a friendly spirit, or rather, let there be no rivalry but that of a strong desire to excel. It matters not at all what the nationality or sex of a painter may be, since art is of no country and no sex.

PENGUIN.

HORRORS OF THE BOYCOTT. — We commend the following extract from the London *Telegraph* to those Americans who entertain a mawkish sympathy for the Irish in their struggle against the landlords: —

"If the whole light of English opinion were concentrated on the face and figure of Norah Fitzmaurice, the Irish land question and the Irish race would be better understood than after years of debate and libraries of blue-books. Here is a young orphan girl who, when she attends mass on Sunday, has to be guarded from outrage by sixteen policemen. Yet she lives in her old home, surrounded by the relatives and friends of her childhood, and she kneels in the chapel where she and her family have worshipped for generations. She is a farmer's daughter; she is a Catholic, like all her kin; and purely Irish in race and name. On one Sunday, when she entered the sacred edifice, two ringleaders rose, gave a signal, and fifty of the congregation left the building. This 'boycotting' does not cease during the week; she is an outcast among the neighbors, leading a desolate and forlorn life. Every one remembers the pathetic figure of Hester Prynne in Hawthorne's wonderful tale of "The Scarlet Letter"; how the woman moved about with the stigma of her offence upon her, a thing of shame, pity and dread to all, young and old, who caught sight of her pale face and lovely form, mingling among the people like the ghost of a dreadful sin, haunting the sunshine, and casting a chill shadow on the souls of men. In that case the wife so doomed to a kind of life-in-death had committed adultery, and the stern rigor of Puritan times affixed on her a terrible sentence. But Norah Fitzmaurice is an innocent girl. It was her misfortune not her fault, that one morning she went with her old father to the market. They had not left their home many miles when two men — neighbors and friends — followed them. The father fell back to talk to them, and then the daughter saw him shot before her eyes. He died in agony in a few hours. She had to speak the truth in a court of justice, and identify the men. This is her only offence. For this she is denied by her neighbors the common necessaries of life. They will not speak to her or greet her; without police escort she is not safe from the emissaries of the league. One day or night without protection would be fatal to her. All the sympathy of the people is with the murderers, who were cheered on arriving at the county jail; all their hatred is reserved for the poor girl who saw her father murdered before her eyes. We ask English women, English wives, English daughters, to realize this horrible perversion of the instincts of humanity; this political agitation, which has turned a naturally kind-hearted peasantry into cruel and cowardly brutes. What would an Englishwoman feel if politics here ran so high that gray hairs dabbled in blood excited no pity, that the daughter of a murdered man should be hunted and haunted, her grief mocked, her sorrow made her crime, her prayers as she kneels at God's altar disturbed by organized riot? Yet that is what this young Irish girl has to endure because her father sinned against the unwritten law of the league and was killed for disobeying it.

A PUBLIC WORKS DEPARTMENT IN THE UNITED STATES.

Lookout Tower near Eisenach. From Arkitektonische Rundschau.

IN the United States of America, national public works are carried out in a somewhat peculiar and not altogether satisfactory manner. Taking, as an example, river and harbor improvements, and which probably constitute the largest portion of these works, we find that each year a number of schemes are embodied in a River and Harbor Bill, and are presented to Congress to secure its approval as national undertakings, and the right to annual appropriations for their execution. Of course every district is desirous to have the improvement of its waterways carried out at the public expense, and hence the schemes are often local and isolated in their character, and are supported or opposed by the senators, to some extent at least, from motives of local patriotism and interest. The result is that many valuable projects do not get the consideration they merit, because they fail to enlist active sympathy, while others which are more successful are not sufficiently wide reached, and are treated in too narrow a fashion. Waterways, to be of much utility, must form part of a well-conceived plan giving an avenue of communication over long distances. It is for long transit that they are specially valuable, and though it is, no doubt, gratifying for local traders to be able to force down the charges of the railway companies by fostering the competition of canals and navigable waters, yet money spent upon a part of a waterway without regard to the remainder of it, is often partly wasted.

When a project has been approved, and an appropriation has been made for it, it is customary for it to be carried out by the Corps of Engineers of the United States Army, with the aid of civil assistants to perform duties of less responsibility. The officers are trained at West Point as military engineers, and are allotted to the various works by the President. It does not appear that their education is specially directed to the construction of civil works, and it not unfrequently happens that their assistants have had greater experience than themselves. Yet in spite of these disadvantages, the Corps of Engineers have done an immense amount of work, for we find that up to the end of 1882 the United States Government had spent on civil works the large sum of £78,966,000 sterling, of which £21,000,000 had been spent on rivers and harbors, £18,000,000 on forts, arsenals and armories, and £17,000,000 on public buildings. The civil engineers of America have had very little connection with the Government work. It is only the inferior offices which are open to them, the pay is poor and the credit naturally goes to those who stand at the head of the enterprise. Consequently the military men have had the direction in their own hands, a most extraordinary feature in such an unmilitary country. With the exception of England every Government of importance maintains an engineering service for the purpose of carrying out the works which are held to be matters for the State to attend to. But even in Germany and France the constitution of such services is essentially civil, while in India, where from motives of economy military engineers are largely utilized in the Public Works Department, the administration is civil and the prizes are divided between the two elements of the service, both officers and civil engineers being capable of holding the higher positions. The system in vogue in America is viewed with considerable dissatisfaction by the civil engineers of the country, who feel that it is alien to the ideas and methods of the American people, and that it works badly both for the profession and the general welfare of the commonwealth. In England we have no military engineers engaged on civil works to raise feelings of jealousy, but we know that in India there is often a good deal of friction between the two branches of the Public Works Department, although they have both the same professional status. This feeling must be greatly intensified in a country where all the great State enterprises are monopolized

by military engineers, who will consequently rank higher in public esteem than those who are confined to private enterprises. This is, no doubt, a substantial grievance, although of a purely sentimental kind. But we fear it is one which must be borne in mind, unless other reasons can be found for instituting a new system. If the Government find that they get their work well and cheaply done they will scarcely be disposed to change their method of operations simply because the civil engineers are jealous of the prestige of their military brethren. The present method, however, is attacked on far wider grounds than these.

It is contended that the system of organizing State works is founded on a wrong basis. What is wanted, in such a case as that of rivers and harbors, is that there should be a scientific department of the Government who should take charge of the entire country, and carry out the improvements on a systematic plan. This department would have no local prejudices, but would treat each waterway as a whole, getting out a complete scheme which would utilize the natural advantages of the river to the utmost, and render it of the widest possible service. Before an appropriation was asked for, the plan would have been subjected to the careful scrutiny of all the chiefs of the department: its merits and disadvantages would be discussed; its cost would be estimated with the greatest care, and Congress would have the assurance that the money they were asked for was to be expended on a project that would be of great public utility, and would be laid out in the most economical manner consistent with efficiency. This is just the opposite of what occurs now. Plans are included in the general bill without due consideration, and are conceived, to a great extent, from a local and limited point of view. If they are accepted by Congress they are carried out by men who are not responsible for their inception, and who have not the power to change their essential features. The result is that the national funds are spent in an unsatisfactory manner, and that the improvement of one part of a river often proves a detriment to the remainder.

The civil engineers of America, as represented by the Executive Board of the Council of Engineering Societies on National Public Works, while desiring to abolish the present plan, do not propose to follow the method we adopt in England of leaving everything to private enterprise. On the contrary they would have a more highly organized official engineering department, capable not only of carrying out works, but also of inaugurating them, subject to the approval of Congress. As a preliminary measure they limit the jurisdiction of the new department to rivers and harbors, as these are works which suffer most from the present system. The department which they seek to create is to be open, as regards the lower grades, to all who can succeed in entering it by competitive examination. Promotion will be controlled partly by examination and partly by selection until a certain stage is reached, by which time it is assumed that the non-competents will have been weeded out, and only reliable men will be found in posts of responsibility. After that, seniority will govern the advance of candidates for the highest ranks. This method, however, will not avail for the creation of the department. This is to be effected by transferring about one-half of the present army corps to the new department, and by selection of civil engineers at present in independent practice. The present civil assistants would fill the lower posts. It is estimated the cost of the proposed Corps of United States Civil Engineers would not greatly exceed that of the present establishment, while it would be far more efficient, partly because it would consist of men trained for the work, partly because the civil assistants would have an assured future and would not leave as soon as they became efficient, and principally because the initiation of new enterprises would be in the hands of a technical staff, instead of those of committees and other irresponsible bodies.

It is impossible not to sympathize with the desire of the American engineers to see the public works of the country carried out in a better manner than at present. The employment of military engineers for such projects was probably very defensible at the time it was commenced, and possibly for long afterwards. They were systematically educated at an academy kept up at the Government expense at a time when there were but few other facilities for engineering instruction in the country, and no doubt their scientific attainments were superior to those of the average civil engineer. It is true that a good deal of their period of study must have been taken up by purely military matters, but in spite of this they acquired a knowledge of science and the principles of construction, which prevented them going far astray, even when commissioned to undertake work outside of their special experience. The days of specialism had scarcely arisen then. Now, however, each department of engineering has become highly organized, one man taking this department and another that. The all-round man is dying out, and the military engineer, who is equally ready to build a fort, bore a cannon, construct a railway, or canalize a river, finds that his work will not stand the criticism of those who profess to do only one of these things. Modern enterprises become so vast that it is imperative they should be conducted with all the skill which comes from long training and exhaustive study of a particular subject, and hence the petty economy of utilizing the time of the soldier during periods of peace ceases to be worth consideration.

But if it be important that the engineer of a project be a man of great experience, it is far more important that the ends which the undertaking is designed to attain should be commensurate with the expense, and should be as wide-reaching as possible. This is a result which we endeavor to secure here by leaving all such work to private persons, who are supposed to be the keenest guardians of their own interests. But in America this method is impracticable in many instances, especially as regards waterways, and hence the necessity of providing a technical tribunal to decide on the merits of all plans, and to undertake the responsibility of their execution. This is what we do ourselves in India, and what is done by all the great Continental Governments, and it is only a question of time before the same method is adopted in the United States. — *Engineering.*

SPONTANEOUS COMBUSTION IN SHIPS' CARGOES.

CORNICE FROM THE CHURCH OF SAINTE-CROIX AFTER DECORATION

DR. W. DORING, Royal Instructor of Navigation at the Deutsche Seevarts, Hamburg, recently published a most interesting paper upon the subject of fires on shipboard and the best means of preventing them. The Hydrographic Office, in view of the importance of the subject, has prepared a translation of the paper, of which the following synopsis has an indirect interest for architects:

Conditions of Spontaneous Combustion. — In order that combustion may exist there must be both a combustible material and something to maintain combustion. Air usually does the latter. When wood, etc., burns, the carbon and hydrogen of the wood unite with the oxygen of the air, and produce water and carbonic acid, two of the best extinguishers. Remembering this, one should at the outbreak of a fire in the hold stop every hole and seam as closely as possible, both to keep air from going in and to keep the smoke from getting out, for smoke contains carbonic acid, a more powerful extinguisher than water.

Steamers should be fitted with pipes whereby to introduce steam into the hold and drive the air out. How successful such a course would be is indicated by the case of the American bark "*Prairie Bird*," Captain Sanford, at Key West, in 1875, loaded with cotton. She got a steamer to blow steam into her hold for three days, and although badly burned, the fire was completely overpowered.

Acids. — Underwriters object to their being carried in the hold. They should be carefully stowed on deck, and a clause should be put in the charter, "with liberty to throw overboard for the safety of the ship, if necessary." Slaked lime neutralizes these acids, as well as chalk, soda, potash, etc., and a vessel should always have a quantity of some of these on board ready to use if she is to carry acids. The volatile and inflammable nature of ether, benzine, etc., should always be considered as dangerous to the safety of the ship.

The following articles are subject to spontaneous combustion when allowed to absorb moisture: Saltwort, bone-dust, charcoal, chocolate, roasted chicory, roasted coffee, grain, raw cotton, cotton offal, fibrous plants, animal substances of all kinds, jute, flour, guano, hay, hemp, flax, lamp-black, glue, tow, grits, old rags, cotton (especially dangerous after being used about the engines), oil-cake, oil-cloth, paints, printer's black, coal containing sulphuret of iron, loaded during wet weather, and not protected afterwards against moisture.

The following are dangerous on account of spontaneous combustion through sublimation or the escape of vapors: Bituminous coal; several varieties are markedly apt to evolve inflammable gases (hydrogen), so that an explosion is apt to result whenever an open light is brought near. This coal is not to be confounded with that containing sulphuret of iron. The gases should be conducted out by prearranged ventilation. Guano also evolves much gas when damp, and is dangerous near a light.

Spontaneous Combustion of Coal. — Professor J. Von Liebeg writes a letter in which he suggests covering the coal with a thin lick of tar, to shut out air and water. He remarks that large lumps are not so dangerous as small ones, and hard ones are not so dangerous as those that break easily, and that in all cases of spontaneous combustion on record the coal contained sulphuret of iron, which, he says, can be detected by the eye in numerous small yellow spots.

Preventive Measures. — Lay at least six inches of dunnage, work the pumps carefully, and supply masts, pumps and hatches with a double covering of tarpaulin. Ventilators to lead off the gases in all kinds of weather, fitted in the deck to reach the coal, but not down to the bilges, for if the fresh air is allowed to circulate through the coal it will only heighten the danger which it is intended to obviate. The ventilators should be at each end of the compartment, and not alongside of each other.

On long voyages the temperature of the cargo should be taken and logged each day at several places. This can be done with an iron rod jammed down into the coal, or, still better, with a hollow iron or brass-pipe, inside of which a thermometer can be lowered.

Dr. K. Broockman writes to the author and sums up his conclusions in one sentence: "Coal-gas explosions can be prevented by ventilation."

His conclusions are as follows:

1. Ship only hard coal, for the softer and more friable the coal is the greater is the volume of gas thrown off.

2. Compartments in which coal is stowed must be well ventilated, allowing all gases to pass off into the outer air. Simple pipe as thick as one's arm ought to suffice; perhaps one could utilize the ship's motion.

3. The compartments should be entered only with a safety-lamp, such as is used in mines. There is no absorbing substance for methan or marsh-gas.

4. Freshly delivered coal is much more dangerous than that which has lain for some time in free air; the gases in it are often under an enormous pressure (thirty atmospheres), so that large pieces sometimes blow off, endangering the lives of workmen.

5. Methan or marsh gas is odorless.

From section 4 it appears that the hatches should not be closed as soon as the coal is stowed, and that one should not enter the hold with open light; the same applies to the cabin or forecastle when they are between decks.

Since this gas is odorless one should not even use open lights later on during the voyage; safety-lamps are much more to be recommended.

THE OLD STATE-HOUSE AT RICHMOND, VA.

CAPITAL ON WELLS CATHEDRAL AFTER "THE BUILDER"

THE old capitol at Richmond is a veritable curiosity shop — a mine of wealth to the antiquarian who does not care to go back of Pocahontas and John Smith. One caa see there old deeds and records dating back to 1620, when Virginia's capital was at Jamestown. They were curious looking old things on parchment—nothing left but the seals and the moulds. The writing became illegible half a century ago. The old building itself is 103 years old, its corner-stone having been laid in 1785. Thomas Jefferson brought the design from France in 1801, and with it a model, that of the Maison Carrée, an ancient Roman temple at Nismes, France. Exteriorly the model was faithfully adhered to, but the interior, of course, had to be adapted to circumstances. It is a quaint old building, and so dirty. The colored population of Richmond seems to have full possession. Apples, cakes, pies and all manner of catchpenny viands are thrust at one from every niche and cranny. Beggars, hideous cripples, all sorts of helpless folk assail one at every turn, and the smell of it all is dreadful.

But for its historic interest and the value of its contents the progressive Virginia of to-day would be justified in setting fire to it, the more so as it occupies the only site available for a first-class modern structure. The basement floor, with its little seven-foot ceiling, its creaking doors, with old cast-iron locks, its brick-flooring, and its array of negro pedlers, is not inviting. Here are the auditors of the State of Virginia, the treasurer and register of the land office. The walls are begrimed, the carpets cheap ingrain, and the furniture was made in 1836 — so a guide said, and his story was believed. The superintendent of the land-office, having but little now to do, is *ex-officio* custodian of the State-house. His land duties and his custodianship seem to sit alike lightly on his shoulders. What they call in Richmond the "rotunda" of the capitol is the floor above. It is about three times as large as one of the elevator cages in the Chicago City-hall.

In the middle, surrounded by a heavy iron rail, stands the one great authentic and authoritative likeness of Washington. This is the great Houdon statue. Houdon was a French sculptor, sent over from France in 1785 by Lafayette. The General Assembly of Virginia employed him at Lafayette's request to make a life-size picture and portrait of Washington as he then existed — the retired soldier and president. M. Houdon spent two weeks at Mount Vernon, took a cast of the Washington face, measured his head, his body, his legs, and got a fac-simile of his cane, his ruffle and his shoe-buckles, and the result was, in two years more, the famous statue. No representation of Washington now extant is supposed to be so natural as this. For many years the government has accepted M. Houdon's likeness as the one to be put on bonds, postage-stamps and all other public prints. The 2-cent postage-stamp is an exact reproduction of the profile of Houdon's face of Washington, and as such not an American soul that ever writes and mails a letter can fail to see and know it. There are some *replicas*. One is in painted copper in the capitol at Washington. Another in plaster is said to be in Albany, New York. None of these can equal the original, as it stands to-day, in that old Richmond capitol. A rickety iron railing surrounds it. The brick floor is covered with orange peels and banana skins. Colored beggars assail the visitor, book-agents badger one, the iron railing itself is rusted, the great statue has a greasy and moldy look — not soiled, but dingy with age. From the gallery above, where the portraits are, the top of the head is seen to be covered with dirt half an inch thick. There seems to be something wrong about it all. The old portrait-gallery is better preserved. Here are the canvases of all of the old governors of Virginia from Lord de la War and Alexander Spotswood down to Gil Walker and Kemper. All have their names on the frames except Gil Walker. His magnificent white hair and moustache are left to speak for themselves. Moreover, the frame containing his picture is put in the nethermost corner, where he who runs will have to know the man and read quick to know his identity. They have put Kemper's name on his picture because he was a Virginian, but it is put well up out of sight. The succeeding governors have not yet been honored.

But the whole of one end of the quadrangle has been cleared to honor some other people. Here appear the pictorial evidences of Virginia's pride and boast in the last half century. There are but three pictures, but they take up all of one of the four sides. The Spotswoods, the Masons, the Randolphs, the Monroes, the Tylers, even Jefferson, Washington (by Peale), "Light Horse" Harry Lee, Lord Dunmore, Patrick Henry,— all have to submit to a "doubling up" to make room for the three great life-sized portraits which Virginia patriots felt they must buy before they adjusted their debt.

That of Robert E. Lee is a magnificent work. It is a full three-quarter figure, life-size, the study made while he was president of the Washington and Lee University. The frame is massive and it occupies the centre of the space. To the right is another full-sized painting of Stonewall Jackson. This is in full confederate uniform, the only one of note, by the way, that is so represented. To the left is the third great Virginia soldier, General Joseph E. Johnston. Like General Lee he is portrayed in citizen's dress, the figure being a three-quarter drawing, life-size. General Johnston looks in the picture just as he does in the office of the United States railroad commission. He doesn't seem to have grown an hour older. Smaller portraits hover about these, notably A. P. Hill, Jeb Stuart and General Pickett, of Gettysburg fame. The old darkey guide, in taking one around the gallery, is prolix when he comes to the colonial governors and Thomas Jefferson, but as he approaches the great portraits he simply says: "Gineral Lee, Gineral Johnston and Old Stonewall," and then the miserable old hypocrite puts his handkerchief to his eyes. He thinks that is good for another Northern dime at least.

One gets somewhat inspired with the glory of "Ole Virginny" it must be confessed, as he goes through the corridors. In a recess near the portrait of Washington by Peale, is the old chair sent from England in 1790 for the use of the Speaker of the House of Burgesses, then meeting at Williamsburg. It is a curious old thing. The back is nine feet high and the seat about nine inches wide. A modern speaker like Sam Cox might sit on its edge, but Carlisle would have hard work, and a fat man like Keifer, of the Forty-eighth Congress, couldn't reach a half-way balance on it. The present speaker of the Virginia House of Delegates might get his coat-tails in it, but no more. It is an odd piece of furniture, upholstered in old-fashioned red silk, so faded as to be colorless. The top of the back is a carved sun-burst, and there is a hole through the upholstery that looks as if it might have been made by a bullet. The old chair was brought up from Williamsburg just ahead of McClellan, in 1862, and perhaps a leaden missile did go through it.

The old stove, too, is a great curiosity. It was the first "warming box" ever brought to America. It was made in England in 1770 and sent over by the Duke of Beaufort as a present to the "Colony of Virginia." It was used for warming the House of Burgesses in Williamsburg until the capital was removed to Richmond. It is a "three-st'y" affair, standing seven feet high, but nothing unique in its appearance. It shows simply that the science of stove-making has not advanced much in the last one hundred and twenty years. The same principles of radiation appear in the old Virginia "warming box" that we have in the ordinary wood stove of to-day.

The library, on the upper floor, contains many objects of interest. There are a "lawyer's fee book," kept by Patrick Henry; Jefferson's marriage contract written in his own hand; Lord Cornwallis's parole at Yorktown, signed by himself; Stonewall Jackson's last official despatch, written in lead pencil on the field of Chancellorsville an hour before his death, and a number of other things. — *Correspondence of the Chicago Tribune.*

DANGEROUS WALL-PAPERS.

EARLY CARVED FRENCH ORNAMENT AFTER "DECORATION"

EVERY now and then some incidents come to light which show that we are surrounded by dangers of which we little dream. One of these sources of danger has always been considered the poison which formerly used to be introduced into wall-papers by careless or ignorant manufacturers, and it is with sincere surprise and regret that we hear of renewed suspicion being cast upon wall-papers. The circumstance is all the more astounding as the papers in question are stated to be of English origin, while the accusers are American, and we hope that, for the sake of the reputation of our English manufacturers, the makers of these particular wall-papers

will be able to prove that these various charges are unfounded. The facts are narrated by Dr. Charles Harrington, of the Harvard Medical School, in the Boston *Medical and Surgical Journal*, of March 1, and refer to a purchase of English wall-papers with the manufacturers' guaranty that they are non-arsenical. Dr. Harrington states that tests made after their receipt by the Boston purchaser showed that arsenic *was* present, and accordingly the Boston house objected to receiving and paying for them. The English manufacturer, thereupon, reiterated his claim that the papers were non-arsenical, and in proof thereof sent a testimonial from Professor John Attfield, Ph. D., F. R. S., F. I. C., F. C. S., who said:

"Not one of these samples is an arsenical wall-paper; that is to say, not one of the pigments or color-giving substances on the papers is arsenical, and the paper itself of these paper-hangings is not arsenical.

"Pseudo-sanitarians sometimes report non-arsenical wall-papers as containing some ridiculously-minute trace of arsenic. These alarmists might just as truly report some samples of common table salt as containing arsenic, for the delicacy of certain of the tests for arsenic is so great that traces can be detected in many things. But such traces are absolutely without significance from any sanitary point of view, either in salt, wall-paper, or anything else. Arsenical wall-papers have well-defined arsenical characters, were formerly common, and may now occasionally be met with. Neither of these samples is an arsenical wall-paper."

In order to disprove this very emphatic statement, analyses of these papers were made by Henry B. Hill, Professor of Chemistry in Harvard College; Dr. Charles S. Sanger, Professor of Chemistry in the United States Naval Academy, and by Dr. Harrington, who is the Assistant in Chemistry and Instructor in Hygiene in the Harvard Medical School, and the following table shows the results of their examination as compared with those made by Professor Attfield:

AMOUNT OF ARSENIC IN GRAINS PER SQUARE YARD.

No.	Hill.	Sanger.	Harrington.	Attfield.
1	4.66	4.08	4.40	—
2	0.85	0.73	0.90	—
3	0.93	0.73	0.82	—
4	0.63	0.71	0.78	—
5	0.21	0.23	0.28	—
6	0.12	0.04	0.14	—
7	0.10	0.08	0.13	—
8	0.21	0.22	0.22	—

Our contemporary therefore comes to the conclusion that according to the American analyses all of the papers contained more than the permissible limit recommended to the National Health Society of England by its committee, and adds that, in view of the reputation which Professor Attfield has in the United States, this result is certainly very surprising, but that it shows how desirable it is to take such guaranties with great reluctance and caution. The article closes with the following tirade: "It is well understood by pharmacists and chemists that there are always to be found a certain number of chemists holding prominent professional positions who can be depended upon to furnish certificates which favor the interests of those who employ them, but we are loth to believe that Professor Attfield is to be classed among them. He certainly owes it to himself to offer some explanation of such a decided variation between the results of his own analyses and those of the American analysts in the present instance." Professor Attfield holds a well-earned and spotless reputation in this country as well as in the States, and we feel sure he does not belong in the category of the "certain chemists" of whom our American contemporary speaks so pointedly. We, therefore, feel sure that he will be able to clear himself from such insinuations, but we should like to go farther and ask, who were the manufacturers of these papers, and what have they to say to so serious a charge? It is a question which is of importance to all English makers of wall-papers, whose good name has been placed in jeopardy amongst our American cousins, and we hope that they will take the matter up in a proper spirit. —*Invention.*

BOOKS AND PAPERS.

DURING the last half-dozen years which have seen the annihilation of uncountable dry-plates, innumerable questions have suggested themselves as to the whys and wherefores of the many provoking failures we have made in photographies. Working spasmodically, as rare idle moments presented themselves, it is little wonder that perfect success was so seldom achieved, but just what it was that sometimes produced perfect negatives, was no less puzzling than what it was that as often produced perfect failures, and it was slowly borne in on our mind that this fascinating art had its foundations in science, and that it would be quite useless to seek the answers to the riddles without first having, with some little thoroughness, refreshed one's memory as to the operation of the laws of optics and the order of chemical reactions. By blindly following the instructions of the hand-books that are prepared for the use of amateurs, a reasonable measure of success rewards the operator, until there comes occasion for leaving the plain road and attempting to work to the desired end with no better guide than an awakened instinct. In such straits as these recourse is had to books, which teach the subject with all desirable thoroughness only to find that they are somewhat diffuse in treatment and voluminous in bulk for a busy man, who is not preparing for a professional career, to spend his time over. There was really a need for something between the slight hand-book and the all embracing treatise, and such a book[1] has been prepared by the editor of the *Philadelphia Photographer* and the writer of several books on photographic methods. It is adapted to the needs of both amateur and professional, and would be a useful hand-book to have in any gallery, and it has one preëminent qualification for such service, it is nearly square in form, and, as a consequence, will open out flat and stay open, as books of the usual shape rarely will.

It is a very curious book in its make-up, a double-headed Briareas which helps with both head and hands. Each paragraph of the author's is paralleled by voluminous extracts from other writers, all bearing on the subject-matter of the paragraph in question. One does not therefore have to stop and go in search of what other authorities say on the point, it is all brought together here in one place, and the book becomes a library of books on photographies, but one in which the differing views are, in a sense, already digested and assimilated for the student.

Text and extracts are fully and admirably illustrated, as will be shown by the statement that nearly four hundred cuts, illustrating processes, principles and apparatus, give point and interest to the text and extracts alike. The thoroughness, and what may be called the impersonality of the book, is shown by the list of authorities who have been laid under contributions, a list which includes nearly three hundred names of professional photographers and scientific authorities, as well as of amateurs, whose experiments and observations are not the least in value.

A good index, fairly well cross-referenced, makes the book useful for quick occasional reference.

AMONGST the many new trade journals which publishers all over the country are sending out in never-ending succession, is one which really seems to touch on a comparatively uncultivated field. Brick and wood and iron have long had trade papers devoted to the development of their respective interests, but we cannot recall that any one has, until now, turned his attention to the attempt to wring fortunes from stone through the agency of printer's ink. Handled seriously, the chance of making a useful and successful journal seems to lie within the reach of the publishers of this one,[2] and one from which architects especially may derive much benefit.

The vast deposits of the most varied kinds of building stones in this country are little known, some not even suspected, others just discovered, and only a few really worked in such a way that the product of the quarry can be really considered "in the market" for the use of any one who prefers, for one reason or another, to use that particular stone. Until within a few years builders used certain stones mainly because they were "handy" to the site, but the increased facilities for transportation now makes it possible for an architect to exercise a limited choice in the selection of his building stone, and we believe that such a journal as this will do a great deal toward very rapidly expanding the field from which selection can be made. There is generally capital enough watching for a chance for investment, and if the editor can point out promising deposits of new varieties there will shortly be many more building stones in the market than there are now.

SOCIETIES.

DETROIT ARCHITECTURAL SKETCH CLUB.

THE architectural draughtsmen of this city have organized an association to be known as the "Detroit Architectural Sketch Club," with the object of improving and advancing its members in all matters pertaining to architecture, by competitive drawings and designs, lectures, etc.

The first semi-annual meeting was held Monday eve, May 14th, at which time a constitution and by-laws were adopted, nearly twenty-five members being present. The following officers were elected, viz.: President, J. L. Saunders, from the office of Mason & Rice; Vice-President, A. D. Adamson, from the office of Spier & Rohns; Secretary, C. A. Fullerton, from the office of Messrs. Van Leyen & Preston; Treasurer, J. B. Nettleton, from the office of Donaldson & Meier; an Executive Council consisting of the officers and three active members, viz.: Albert Kohn, of Mason & Rice; M. H. Grills, of Scott & Co., and W. E. Pasco, of Donaldson & Meier.

The club starts out with good prospects and lots of enthusiasm, with the promise of help from the architects. You may expect to hear from us soon. Sister clubs, the hand of good fellowship is extended. Address communications to

C. A. FULLERTON, *Secretary*,
18 and 19 Burns Block, Detroit, Mich.

[1] "*Wilson's Quarter Century in Photography.*" A collection of hints on practical photography, which form a complete text-book of the art. By Edward S. Wilson. New York: Edward S. Wilson, 853 Broadway, 1887.

[2] *Stone.* A journal for producers, workers and users of Stone, Marble and Granite. Published monthly by the D. H. Ranck Publishing Company, Indianapolis.

COMMUNICATIONS

STRENGTHENING OLD FLOORS.

New York, May 7, 1888.

To the Editors of the American Architect: —

Dear Sirs, — Will you be kind enough to inform me as to the utility and desirability of the following method? I refer to the *American Architect*, No. 628 (January 7th 1888), and in particular to the latter part of Article XXI on "Safe Building," treating of cross-bridging. It is mentioned that in case the floor-beams in an old building have settled, and provided the beams are still strong, that it is a good method to put wedged-shaped blocks between the beams, bore the beams and run an iron rod through them between the lines of wedges from the outer beam at each end of tier, and by screwing up a nut at one end, bring the whole series of beams up to a level and if desired somewhat crowned or cambered. Now the point I would like to bring up is, whether in building a new house, say an ordinary twenty-five-foot city dwelling, it would be a good plan to substitute for the usual cross-bridging in each tier of beams, blocks just such as are mentioned but not wedged-shaped, merely inserted tightly between the beams, and with the iron rod, washer, nut, etc., used in the same way. Also, would it be well to camber the beams a trifle, by using very slightly wedge-shaped blocks? It seemed to me this method would give to the floor beams of each tier, a unity as regards their strength and stability and to modify somewhat the problem of settlement particularly in the upper stories. By giving your opinion on the above you would confer a great favor on a subscriber. E. K. B.

[The iron tie-rod would be a very useful addition to the bridging of a floor. With it we should, however, prefer well-nailed and well-fitted cross-bridging to the solid blocks, which are sometimes used. — Eds. American Architect.]

PROVIDENCE, R. I., SEWERAGE SYSTEM.

Toronto, Can., May 19, 1888.

To the Editors of the American Architect: —

Dear Sirs, — Could you inform me through the columns of your paper where I could obtain a copy of the regulations respecting the construction of the sewerage system for Providence, R. I., and oblige, Yours very truly, Geo. H. Richardson.

[Address Samuel M. Gray, City Engineer, Providence, R. I. — Eds. American Architect.]

NOTES AND CLIPPINGS

The "Canals" of the Planet Mars.— People who can obtain the privilege of looking at Mars through the Lick telescope should not neglect the opportunity. Several years have elapsed since that remarkable planet could be seen to such advantage as at present, and it will be three years before we have an equal chance again. It has certainly never been examined before through a telescope of such power as the monster refractor on Mount Hamilton. It may be interesting to lovers of astronomy to know that the eminent French astronomer, M. Perrotin, is engaged in a minute study of Mars, and that his discoveries confirm those of M. Schiaparilli in every particular. It seems actually true that the longitudinal stripes which circle round the planet are bodies of water, and must, according to all laws of probability, be artificial. No one ever saw or conceived a system of parallel rivers from 1,000 to 2,000 miles long and straight as a plumb line. Everything is possible of course, but such straight rivers it is impossible to reconcile with the principles of cosmogony as we understand them. On this planet, at all events, nature abhors a straight line, and by analogy it should do so in Mars. Yet, if these bodies of water are canals, as Schiaparilli believed and Perrotin seems hardly to doubt, what monstrous works they must be! They are from fifty to eighty miles wide. Fancy the labor of digging such a canal, the time it must have taken, and the number of workmen it must have employed. The pyramids of Egypt are trifling in comparison. The Suez Canal is 197 feet wide at the surface, and the Nicaragua Canal is to be 150 feet; the Martial canals are 2,800 times wider. Our canals on this one-horse globe are considered long when they reach 100 miles in length. The Panama Canal will be less than 60 miles long. The canals of Mars reach a length of 2,000 miles — say as far as from here to Omaha. What a traffic there must be to support such enterprises! On the waterways of China travellers describe the incessent ebb and flow of multitudinous crowds, but to require canals of such dimensions as we have described, the movement of traffic in Mars must be far more prodigious. In fact, they imply a population which almost staggers belief; considering that the volume of the planet is only one-sixth that of the earth, the diameter being 4,400 miles as against 8,000 miles, they warrant the wildest conjectures as to the density with which it may be peopled. What manner of man live in Mars, if there be men there, has always been a favorite topic of speculation. The law of gravitation tells us that he may be fourteen feet high; not such a son of Anak as the inhabitant of the asteroids, but still one who would regard the Belgian giant as a remarkable dwarf. Possibly the enormous public works on Mars may be explained on the theory that these tall fellows can work in proportion to their stature — that one citizen of Mars can shovel as much dirt as two and a half denizens of this world. Whether the grass of Mars is red, as the old astronomers averred, modern telescopes have failed to decide. It is very difficult to determine colors when an object lens collects thirty thousand times as much light as normally enters the human eye. But the speculative astronomer is safe in asserting his belief that Martian cabbages are of the color of our beet-roots, as no one can disprove the assertion.— *San Francisco Call.*

Mr. William Morris on Modern Architecture. — Mr. William Morris, writing in the *Fortnightly Review* for May, expresses the opinion that there has been, in this century, something like a revival of architecture. Does that revival, however, indicate "a genuine growth of real vitality," or does it merely point to "a passing wave of fashion?" Mr. Morris's own view is that the revival is too limited in scope, too much confined to an educated group, to be regarded as a vital growth capable of true development. He commends Mr. Robson's "simple but striking" London Board Schools, Mr. Norman Shaw's "elegantly fantastic" Queen Anne houses at Chelsea, and Mr. Bodley's "excellent" new buildings at Magdalen College; but these, he holds, are mere eccentricities with which the general public has "no part or lot." Nor, we gather, does he believe that things will be any better till the everyday work of the population ceases to be mechanical drudgery, with which, in his opinion, our existing architecture is only too thoroughly in harmony. The explanation of our weaknesses in this direction is not so obvious and easy. The reason lies partly in our climatic conditions, which are unfavorable to any style of dwelling not solid and durable; partly in the lack of a general sense of beauty and appropriateness; and partly in the daily growth of our numbers, which tends to the constant "running up" of tenements at once cheap, flimsy and ugly. Matters would be different, no doubt, if our system of local government enabled men of taste to put a veto upon unnecessarily ill-favored edifices. A large proportion of the buildings erected are quite gratuitously hideous, and they are so simply because we English are not naturally endowed with artistic eyes. — *London Globe.*

One Way to curtail too lofty Buildings.—The more the public hear about the monstrous building which it is proposed to erect at Albert Gate the less do they understand how the Metropolitan Board of Works came to sanction such a disfigurement. Its apologists plead that it will rise to a height of only 115 feet above the ground. But this measurement does not include the roof, which will certainly add another fifteen or twenty feet. Then there are to be "small towers or pinnacles" on the top of all, so that the total altitude will not fall much short of 150 feet, even if it does not exceed that elevation. Such is the edifice which, unless something is done, will presently dominate the southern side of Hyde Park as the Wellington statue and its nose used to dominate Hyde Park Corner. Can this outrage be prevented? The promoters suggest a monetary arrangement; they are willing to sacrifice their rights in return for a consideration. We think we know a more excellent way. The Commissioners of Works have the power of building a wall on the Park side of the site, thereby blocking the view. Let the foundations, then, be laid with all possible despatch, and we make no doubt whatever that, by the time the wall rose to the top of the ground floor, the promoters would be ready to reduce their terms. If they proved obstinate, the wall could be carried up to the top of the first floor, reducing its letting value by at least one-half. It may be said, perhaps, that the wall would be every bit as hideous as the eyesore it hid. Granted; but the public conscience would be appeased by a sense of just revenge. We care not what the æsthetic charms of the edifice may be or whether it would cast a shadow to Hampstead Hill, or to the Serpentine. *Fiat justitia ruat cœlum;* let the top stories be knocked off, or up with the blind wall.— *Exchange.*

The Roman Wall of London. — Yesterday a large assembly of antiquaries and archæologists took place at a spot in Aldersgate, a little to the north from the new buildings of the General Post-office, for the purpose of inspecting a portion of the old walls of the city, close to what was in all probability their northwestern angle. This portion was first discovered and laid bare in the early part of last autumn, when the Bull and Mouth Hotel and the French Protestant Church were removed in order to make room for the intended additional buildings. The length of the wall now exposed to view is about one hundred feet, and the greater part of it stands about ten feet above the soil. This is largely mediæval; but the portion below the surface soil measures about fifteen feet or sixteen feet, and this is composed of stones and bricks, laid in alternate strata, after the Roman fashion so well known at Colchester and Lincoln, and also in other parts of the walls of London, as for instance in Bevis Marks and the Minories. The material is Kentish rag, laid in regular courses, with fine joints and other courses of red tiles with wide joints. As this wall is actually on the boundary of the building site lately acquired by the authorities of St. Martin's-le-Grand, there seems to be no necessity for its removal, and a general opinion was expressed among the antiquaries present yesterday that the wall is too fine a specimen of Roman work to be wantonly destroyed. — *Pall Mall Gazette, April* 27.

The Maria Theresa Monument at Vienna. — The monument to the Empress Maria Theresa, which was unveiled May 13, in the presence of the Emperor Francis Joseph and a great company of Austro-Hungarian notables, ranks with the finest memorials in Europe. It is said that in magnificence and perfection of design, in composition and in taste, it surpasses the famous Albert Memorial in London, and it is larger than Rauch's famous monument of Frederick the Great in Berlin. The Empress is represented in a sitting posture, the figure being in bronze, and it is a grand example of the consummate art of the sculptor Zumbusch. Beside the central statue there are thirteen others, of famous generals and statesmen, and sixteen relief figures, representing men prominent in politics, science and art. The whole thing is in bronze, and the monument contains fifty-four tons of the metal. The figure of the Empress alone weighs twenty-three tons. The memorial is sixty feet high, and is an exceedingly imposing structure. — *N. Y. Mail and Express.*

The Gamboa Dam on the Panama Canal.—Mr. Jacobson, an engineer from the Panama Canal, is staying at the New York Hotel. He arrived on the steamer "*Colon*" from Aspinwall, and is on his way to France. Mr. Jacobson is a graduate of the Polytechnicon of Zurich, and has a fair knowledge of English. His position on the canal works was a very responsible one—that of chief executive officer for the Société des Travaux Publics, contractor for that part of the line between Obispo and Emperador, from kilometres 44 to 53,600, and including the celebrated Gamboa dam. Mr. Jacobson has been in the employ of the Société for a year and a half, during which time he has resided on the canal line, giving the work his personal supervision. He returns to France at this time for needed rest, and to arrange personal affairs. In reply to inquiries about the condition and prospects of the Panama enterprise, Mr. Jacobson expressed his entire willingness to give any information in his power, and to pronounce an opinion upon any matter that fell within the range of his observation. He said work had commenced on the Gamboa Dam, which, after long hesitation, was at last decided to be necessary for the control of the Chagres River. Of the 3,000,000 cubic metres of material that the dam is to contain, about 30,000 have been deposited on the opposite ends of the works, at the bases and sides of the two large hills Obispo and Santa Cruz, between which the dam is to be situated. These deposits are far enough from the bed of the Chagres to be safe from the current, even during a freshet. When, however, the work is further advanced, and the centre of the dam is reached, which is to oppose the flow of the current, it is feared that the floods of the rainy season will carry away all the material within their reach. It is Mr. Jacobson's opinion that unless this central part of the dam can be completely finished in a single dry season, it will be found very difficult and perhaps impossible to construct it at all. Mr. Jacobson says, with reference to operations during the rainy season (which has now set in) that little more can be done while the rain lasts than to take care of the yards and material and preserve the work already accomplished. Representatives of M. Eiffel, under the new contracts for locks, have begun work at several points, but the plans, Mr. Jacobson says, are still inchoate, and the number of locks and their final location not yet determined. In the excavation of the locks there will doubtless be obstacles to overcome. Already at points between the forty-fourth and forty-eighth kilometres the excavations made are actually too deep for the lock canal on the proposed level, which will necessitate the construction of dikes on one side to raise the water of the canal above that of the river. In this section the canal is in a plane with the Chagres and Obispo at their junction. That part of the Chagres will be suppressed by the Gamboa dam, and its flow diverted into an artificial channel on the south side of the canal, but a dike of about four kilometres in length and nine metres high must be raised between the canal and the Obispo. M. Eiffel will have no part in any of the canal work, except the preparation for and construction of the locks. The other contractors continue the dredging and excavation as heretofore, except for such modifications as the new project necessitates. The completion of the canal does not, therefore, depend upon M. Eiffel any more than upon any other of the contractors. When asked whether he thought the canal could be completed and open for traffic in 1890, Mr. Jacobson smiled broadly, and said that if the work on the Isthmus could be completed in five years, it would be a great achievement.—*N. Y. Evening Post.*

An Old Chinese Printing Establishment.—A correspondent of the North China *Daily News*, of Shanghai, describes a printing establishment which he found in a village in the interior, about 150 miles from Shanghai. The printing was being temporarily carried on in the village temple, and movable type only was used. In the large central hall of the temple were placed about 20 ordinary square tables, on which the cases of type were spread out, very much after the English method, only taking up much more room. At the time of the visit one man was engaged in setting up type; another was printing. The former stood before a table, on which was what may be called the Chinese "case." It was a solid block of hard wood, about 22 inches long by 15 inches broad, and perhaps 3 inches deep. The inside was hollowed out to a depth of about ¼ inch, this depression being still further hollowed out into grooves about ¾ inch deep. The block had 29 of these grooves, each filled to the depth of ¼ inch with ordinary stiff clay. With his copy before him, armed with a small pair of iron pincers, the compositor began his work; character after character was transferred from the case and firmly pressed into the clay. When the "form" was complete, a flat board was placed on the top and the characters, pressed perfectly even and level with the surface of the wooden block, the edge of which was cut to form the border generally found round every Chinese page. The printer now received the form, and carefully brushed his ink over the type. Taking a sheet of paper, he pressed it down all over the form, so that it might be brought in contact with every character. He then removed the sheet and examined each character, carefully adjusting those which were not quite straight with the pincers, and apparently never touching the type with his fingers. After sufficient copies had been struck off, the type was distributed, each character being returned to its particular box. The type in the form was of three sizes, each character being kept in place entirely by the clay in which it stood. They were cut out of some hard wood, and were perfectly square. The writer was told that the art of printing in this way had been handed down in the same family since the Sung dynasty, more than 600 years ago. No strangers were ever taught, apprentices being always taken from the same clan. They were open to take any work at the rate of about a shilling a day, which included the two men, type and ink, but not paper. They were then printing family registers. The custom in that part of the country is to hire the printers, who bring their type and set up their printing establishment on the spot. In this way the same business has been carried on in one family for six centuries, and during all this time movable type only had been used in the manner here described.

Casting in Steel and Bronze.—The old Hindoo art of uniting different metals by casting has been successfully revived in a Boston foundry, where steel and bronze are the metals dealt with. Those portions of the finished article which are to be of bronze are first cast, and after cooling are removed from the mould, and the surface thoroughly cleaned from all traces of oxide or other impurities. These pieces are then placed in a mould having a form corresponding to that of the finished article, and the vacant spaces are then filled with molten steel, which thoroughly unites with the bronze wherever it comes in contact with it. It is proposed to use this process in the production of firearms, with an inner liner of bronze and an outer jacket of steel; but the prospects of a useful arm being produced in this way do not appear very flattering."—*Engineering.*

Tree Planting Extraordinary.—Mr. Assheton Smith is commemorating her majesty's jubilee in a remarkable manner. He has caused to be planted on the slopes of Moel Rhiwen mountain a plantation composed of 630,000 trees. Nearly 200 men have been constantly employed since the jubilee in planting the trees, which will be so arranged as to represent the words "jubilee, 1887." Each letter measures 200 yards long and 25 feet wide. The first tree of the letter J was planted on jubilee day.—*London Standard.*

TRADE SURVEYS

A good many financial writers are troubled over the decreased earning capacity of the railroads and some of the manufacturing interests of the country. There is no occasion for alarm. One journal publishes the returns of 69 railroads for March, and shows a decrease in net earnings of over three million dollars; and other figures showing a decrease on 87 roads in three months of over five million dollars, as against same time last year. There is also a good deal of anxiety borrowed from the fact that a large amount of money is gathering at three or four important financial centres. One class of writers find great encouragement in the easy money market consequent upon this fact; others see in it evidence of a declining commercial and manufacturing activity; another class of writers and thinkers see in it only a conservative movement upon the part of the business interests of the country. Building activity has suffered along with railroad-construction. Manufacturers in a good many branches are making and selling less. This is notably true in iron and steel. Coal-production is maintained at a high point. The anthracite output so far this year, notwithstanding strikes and decreased consumptive demands apparently, is 200,000 more than at this time last year. The markets for both bituminous and anthracite are increasing in a multitude of small places. The lumber trade is holding its own wonderfully, considering the reports of decreasing building activity from so many places. Where the larger cities are falling off, smaller towns and villages are increasing the demands; where the construction of long lines of railroad is falling off, there is a partially compensating demand in the construction of short lines. Where there is a lull in the demand for large machinery, there is an improving demand for small machinery, motive power and equipments. The year 1888 is a year for the small capitalist, manufacturer and business man; for the small building operator and the small operator generally. In cities like Philadelphia, Pittsburgh, Cleveland, and in several larger and smaller cities farther West, the lists of permits published demonstrate this fact. Small houses are multiplying, and small operations are in progress everywhere. Northern builders are making and taking a good many contracts for the construction of houses in the South, mainly in connection with large manufacturing concerns that are springing up. Builders and manufacturers are putting money into house and shop building in the South under good security. Manufacturers there are putting up houses for their workmen in scores of instances. The architecture and surrounding of these houses are indicative of a spirit of progress; many of them have yards for small gardens; all of them are much more comfortable than the average houses built 20 years ago in the North. The evident intention of the leaders of industrial activity in the South is to make their labor comfortable and create some incentive to individual independence. Without writing a thesis on this subject, it should be said that the departure is a most sensible one, and that the attention given to the material surroundings of the workmen will do more to protect the manufacturers of the South against labor agitations and labor organizations than any amount of organization on their part. A great deal of machinery has been ordered in our leading machinery centres within the past 30 days. It is pretty evenly divided between electrical requirements, railroad machine-shop work, flouring-mill and elevator-work, mining machinery and shop-machinery for distribution everywhere. The manufacturing capacity of the entire country is being increased at a time when there does not appear to be much inducement to increase it. Manufacturers are taking a long look ahead, and are tearing out, renovating and improving and expanding in every direction where economies can be subserved. The lumber manufacturers are carefully restricting the product of their mills, excepting in the Southern States, where, according to recent advices from very many quarters, there is almost a booming demand. The manufacturers of yellow-pine, North Carolina sap, Louisiana cypress, and of lumber all through the intermediate territory, are meeting with an unexpected demand for local requirements. Northern manufacturers are participating in this activity, and profiting by it. Some concerns have already contracts that will keep them busy all season. The effect of this is, to throw less lumber upon the Northern markets and to enable Michigan, Wisconsin and Pennsylvania lumber manufacturers to obtain stronger prices than could be otherwise realized. To all present appearances our railroads will be about 10 per cent worse off in net earnings than last year. Of course there will be a very wide-spread opinion that the results of the next six months will offset this. Foreign trade will do but little to relieve the situation. The abundance of money does not seem to be helping the manufacturing interests. A financial stringency is every now and then predicted. There is a larger amount of floating indebtedness among merchants and jobbers, but it is not threatening. Large blocks of money are coming to this side from abroad for investment. Europe is a heavy customer. The large amount of money that has come to this side during the past nine months, is certainly preventing the export of gold which would otherwise take place. It is probable that the industrial depression through which we are now passing will do a great deal of good in bringing prices down to rock-bottom, in checking undue enterprise, in reducing the number of speculative ventures and in creating a generally healthful commercial condition.

S. J. Parkhill & Co., Printers, Boston.

Copyright, 1888, by Ticknor & Co.

NEW PUBLIC LIBRARY, BOSTON, MASS.

McKIM, MEAD & WHITE, Architects.

HELIOTYPE PRINTING CO. BOSTON.

THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. XXIII. Copyright, 1888, by TICKNOR & COMPANY, Boston, Mass. No. 649.

JUNE 2, 1888.

Entered at the Post-Office at Boston as second-class matter.

CONTENTS

A CURIOUS accident occurred recently in New York, the result of which may have a good deal of interest to owners as well as builders. A contract had been made for the removal of a building on the corner of Broadway and John Street, to make room for new constructions, and the contractor, Mr. Southard, was at work with his men, when a floor fell, killing one and injuring several others of the workmen. On examination, it was found that the beams of the floor which fell had been cut short of the inner wall, and, instead of being built into the brickwork, rested at that end on a strip of wood an inch and a half thick, which was nailed to the side of heavy headers, running parallel to the wall. At the outer ends, the beams seem to have been built into the wall in the usual way. The beams are said to have been shorter even than the bearing, and to have rested only one inch on the strip nailed to the header. A further examination, according to the New York *Tribune*, showed that none of the other floors were framed in the same way, and no reason can be found for constructing this one in so peculiar a manner, unless we suppose that the original builders utilized in that way, as the builders of fifty years ago occasionally appear to have done, some timbers too short to run entirely across the building. The coroner's inquest has not yet been held, but the coroner seems to be of the opinion that Mr. Southard will not be held responsible for the accident. In that case it will be interesting to learn who, if any one, will be held so responsible. It is to be presumed that the injured men, and the representatives of the one who was killed, will make a claim on some one for damages. The usual course in such cases is to try to hold the owner of the building accountable, for the reason that he is most likely to have the means of paying the money, if judgment should be given against him. Whether this can be done here is a nice question. Evidently, if the floor fell from defects frequently occurring in such buildings, the contractor would have been in fault for not having guarded against them. If, however, defective construction of this sort is so rare that a man making a business of removing old buildings would not be likely to have met with it, or to have had reason to suppose that it might exist, he would be relieved of responsibility, on the principle, which has been recently maintained by a Missouri court, that the owner is supposed to furnish to a contractor for removal a building of the ordinary kind, free from concealed defects of a sort so unusual that a contractor could not reasonably be expected to think of, and guard against them. In that event, the contractor being exonerated from liability to the injured workmen, there would seem to be a question whether the owner could be compelled to assume that liability. As between the owner and contractor, it seems fair enough that the latter should not be obliged to assume burdens coming from unexpected peculiarities about the building to which his contract related; but whether, the innocent ownership of a structure in which hidden peculiarities exist involves responsibility for accidents arising from them is another matter, on which a good deal of legal wisdom might be expended.

WE are inclined to think that the English and French auctioneers of objects having any historical interest would do well to advertise their collections in the American newspapers, long enough beforehand to enable amateurs to cross the water to attend the sales. A few weeks ago a collection of singular interest was sold at auction, consisting of pieces of furniture belonging to the estate of the late George Godwin, nearly every one of which had once been the property of some very distinguished person. Mr. Godwin had for many years interested himself in forming the collection, and the history of all the pieces had been clearly established, yet the prices obtained for the various articles were, as most Americans would think, far beneath their value. The "crown of the collection," as it was described in the catalogue, was an arm-chair which once belonged to William Shakespeare, and was said, upon what authority it would be interesting to know, to have been occupied by him during the composition of many of his plays. This piece of bric-à-brac brought something over six hundred dollars, not much more, by the way, than we have known paid in New York for an old Belgian arm-chair, taken, we believe, from the sacristy of a church, but otherwise of no historical interest whatever. The next piece to this was Nathaniel Hawthorne's arm-chair, a folding affair, painted, which brought three dollars and seventy-two cents—about what most Americans would be willing to pay for the bare privilege of looking at it, and less than the price which any such object, if in decent condition, would command in an American second-hand furniture store. An arm-chair which once belonged to Sir Walter Raleigh was sold for ten dollars, a price which, we should think, would have brought Hawthorne himself from the grave to bid upon it. Two chairs once owned by the first Napoleon brought seven dollars and a half each, and his mahogany coffee-table, from St. Helena, fifteen dollars. Lord Byron's arm-chair sold for thirteen dollars, a chair which was used by Anne Boleyn during her residence at Hever Castle brought fifty-four dollars, and another, occupied by King Charles the Second at his councils at Yarmouth, brought fifty-two dollars. There are in New York several people who would, we think, cheerfully pay about fifty-two dollars a week for the privilege of exhibiting a Charles II chair in their front hall, and as many more who would think the same rental not very excessive for an authentic piece of Anne Boleyn's property, yet the London bric-à-brac buyers, who will pay forty thousand dollars for a Riesener cabinet, apparently consider that the attraction given to a piece of furniture by its association with the beautiful and unhappy mother of the great Elizabeth is nothing in comparison with the glitter of brass inlays and ormolu.

THE subject of masonwork in freezing weather continues to occupy a good deal of attention in the technical journals. The stories of the excellence of stonework laid with hot mortar in Stockholm and other Northern cities in winter, and then allowed to freeze, have multiplied, while, on the other hand, a recent report by an American engineer, Mr. Emil Kuichling, appears to show conclusively that mortar, particularly if made with cement, and used hot, lost a large part of its strength; the resistance, as determined by actual experiment, of briquettes of neat cement, mixed hot, and then exposed for seven days to the air, being, on an average, only one-eighth that of briquettes of the same cement, mixed at the same time, with water having the temperature of the air, and then exposed in the same way. Curiously enough, briquettes made with Portland cement and cold water would not freeze, even at a temperature of thirteen degrees Fahrenheit, unless exposed to the wind, and the setting process appeared to go on undisturbed even at this temperature; while briquettes made of the same cement, mixed with hot water, invariably froze. With natural cements the resistance to freezing was much less than with the Portland, but no details are mentioned on the subject. The addi-

tion of salt to water, sometimes made to prevent freezing, is found to injure native cements, while Portland is not affected.

THE archæological world mourns the loss of the man who, almost unassisted, made known to Americans the fact that their country had an early history of no small interest, and, by his explorations, raised the mounds of the Mississippi Valley, long regarded as the idle work of a brutish race, to the rank of evidences, not merely of ethnological changes, but of an interesting and tolerably well-developed aboriginal civilization. This earnest explorer was Dr. Edward Hamilton Davis, a distinguished physician of New York, who, after his fortune and reputation were made in his profession, employed his leisure in a study of American antiquities which extended over about thirty years, and made him one of the principal authorities on the subject. The race of Mound Builders attracted most particularly his attention, and at his own expense he opened nearly two hundred mounds, gathering a very large collection of objects from them, many of which, strangely enough, have found their way to England, where they form a part of the well-known Blackmore Museum at Salisbury, perhaps the most interesting collection of American antiquities to the amateur that is to be found anywhere. These explorations he described in a book on the "*Ancient Monuments of the Mississippi Valley,*" which is one of the classics of American archæology.

LE GENIE CIVIL calls attention to a financial chimera which has already made many victims abroad, and is likely to make more here if it is not exposed. In the latter part of last year, it says, a great deal of noise was made in the English papers about an automatic machine for making bottles, which had been invented by one Ashley, and, on being fed with melted glass, blew, by a jet of compressed air, just the required quantity of glass into the given mould to produce a perfect bottle. In this way, it was claimed, the cost of manufacture was greatly reduced, and, the quantity of glass taken and the force of the jet of air being automatically regulated, there was never any loss from waste or defective work. Patents had, it appeared, been taken out for this invention in all civilized countries, and a company had been formed, under the name of the European and American Machine-made Bottle Company, Limited, with a capital of three million dollars, to engage in manufacturing under these patents. It would seem as if a company with a capital of three millions, a large part of which had already been subscribed, need not wait long before commencing operations, but so far, we believe, no manufacturing has been done, and the German technical journals explain this by asserting that it cannot be done in the way described. In one of these journals Mr. Frederic Siemens asserts that no attempt at automatic glass-blowing has ever yet succeeded, and that it is apparently impossible to measure mechanically the force and volume of air required for inflating a bubble of melted glass. As to the European-American Company, he says further that the representations of its prospectus in regard to the capacity of the Ashley machines are inconsistent with each other, and with any reasonable estimate of the speed with which the machine can be operated and material supplied, while the claims of the promoters of the Company in regard to the profits to be expected from the enterprise are founded on statistics of the consumption of bottles in Europe which are grossly erroneous. The sequel to Mr. Siemens's criticisms on the project seems to have appeared in an advertisement which was published last March in a London paper by the counsel for several of the stockholders, inviting the persons interested to unite in an appeal to the courts against the promoters and directors of the company, for having invited subscriptions by a prospectus filled with errors and fabrications.

IT is pleasant to learn that those dreaded foes of the human race, the bacteria, have found an enemy in a tribe of phagocytes, who inhabit the human organism, and endeavor to devour the bacteria, with a degree of success varying with circumstances. These phagocytes, which are otherwise sometimes known as leucocytes, consist of cells, composed of protoplasm, which exist in the blood, and, on the apparition of wandering bacteria, seize and envelop them with protoplasm, in which they become disintegrated and disappear. According to Dr. Metschnikoff, who has seen the bacilli of the charbon virus, perhaps the most malignant infection known, seized and destroyed by the white cells in the blood of a frog, the energy of the action depends greatly upon the temperature, and a frog which easily resisted the charbon infection at ordinary temperatures, was found to become susceptible to it when the temperature was raised to ninety-eight or ninety-nine degrees Fahrenheit. That there is a connection between the absorption of the bacilli by the cells and the diminution of the violence of infectious disorders seems to be quite probable, and Dr. Metschnikoff has found that in mild cases of erysipelas the blood showed multitudes of the characteristic bacteria of the disease fixed in the protoplasm of the white cells, but few or none floating free, while in fatal cases the bacteria were found free in great numbers, while few were fixed in the protoplasm. To the unlearned reader there seems to be a little discrepancy between these observations and those published not long ago, in which it appeared that infections communicated to poultry, by inoculation or otherwise, were arrested by placing the fowls in a high temperature, which seemed to check the growth of the bacilli and ultimately destroy them, and that even the infection of hydrophobia was successfully treated in Russia by putting the patient in the hot room of a bath-house until the attack had spent its force; but it may be that the temperature under which the action of the white cells takes place varies with different animals, and that the protoplasm of a frog is liveliest at a low temperature, while that of a hen is most energetic and voracious at a high one. The whole subject of the natural history of animalculæ needs study. For example, we have heard almost nothing of late about any investigations into the habits of the useful little creatures which live in the upper eighteen inches of the soil and eat up sewage matter. We know that they are put to sleep by chloroform and revive when the effect of the anæsthetic passes away, so they must, apparently, be endowed with some sort of nervous system, but what their habits are in other respects, or how they may be multiplied in case of need, or trained to do their work most efficiently, no one can say.

FIRE AND WATER describes what is certainly the most surprising scheme for providing escape from theatres in case of fire that has yet been devised. The plan is the invention of a newspaper man of Norwich, and consists in an arrangement of the seats, and the floor under them, by which any person in the audience who smells smoke, or is alarmed in any way, has only to touch an "electric button;" upon which a trap-door opens beneath him, and, as he sinks through it, an endless belt, or some similar contrivance, receives him and propels him through a conduit by which he is brought safe and sound to the sidewalk outside. In case all the spectators at once should be seized with panic, and touch the "electric buttons" simultaneously, a provision is made by which each one falls into a particular place on the moving belt, and is thus conveyed safely and quickly, without crowding or struggling, to the open air. As *Fire and Water* says, such an arrangement would expose incautious spectators to a chance of touching the button accidentally, and finding themselves mysteriously removed from the theatre, and thrust out into the street; but there is the germ of an idea in the scheme. In the lively discussion which has been provoked by the publication of Mr. Tarver's patented theatre plan, it has been made clear that in case of fire the upper portions of a theatre are the dangerous ones, and that the occupants of the "parterre," or floor, almost always escape, through the greater purity of the air at the bottom of the building. On this ground Mr. Tarver defends his plan of calling his audience downward and forward from their places to the exits, instead of up and backward to elevated corridors which become almost immediately filled with smoke; and the trap-door arrangement, absurd as it seems, might open a way from the suffocating auditorium to the cool, fresh air of the space beneath the fireproof floor, which would at times be of incalculable value. One merit of Mr. Tarver's scheme is, it seems to us, the retreat of the successive circles, by which the rooms beneath them are shut off from the auditorium by the iron beams and brick arches now generally used for theatre floors; and even if no endless belts were provided to propel the audience automatically into the street, it would be easy to multiply entrances, by trap-doors or otherwise, directly downward from the various circles to the rooms beneath, where fresh air would be found at once, and safety soon afterward.

SAFE BUILDING. — XXVI.[1]

CHAPTER VII.

GRAPHICAL ANALYSIS OF TRANSVERSE STRAINS.

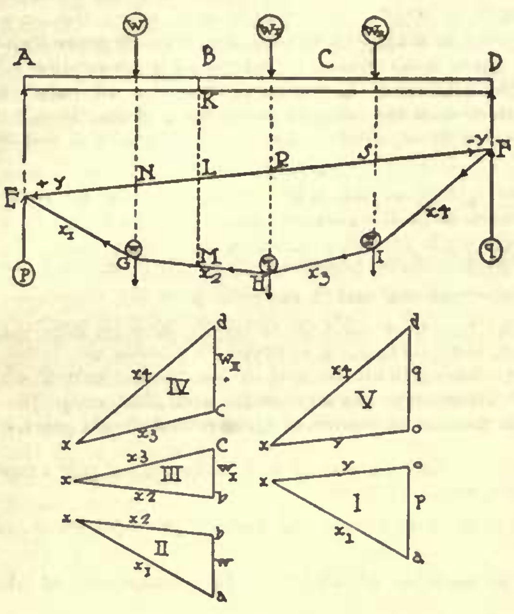


Fig. 149.

ALL the different calculations to ascertain the amounts of bending-moments, the required moments of resistance and inertia, the amounts of re-actions, vertical shearing on beam, deflections, etc., can be done graphically, as well as arithmetically. In cases of complicated loads, or where it is desired to economize by reducing size of flanges, the graphical method is to be preferred, but in cases of uniform loads, or where there are but one or two concentrated loads, the arithmetical method will probably save time. As a check, however, in important calculations, both methods might be used to advantage.

Basis of Graphical Method. If we have three concentrated loads w, $w_{,}$ and $w_{,,}$ on a beam $A\ D$ (Fig. 149), as represented by the arrows, we can also represent the reactions p and q by arrows in opposite directions, and we know that the loads and reactions all counterbalance each other. The equilibrium of these forces will not be disturbed if we add at E a force $= + y$, providing that at F we add an equal force, in the same line, but in opposite direction or $= - y$.

We have now at E two forces, $+ y$ and p. If we draw at any scale a triangle $a\,o\,x$ (or I) where $a\,o$ parallel and $= p$, and where $o\,x$ parallel and $= + y$, we get a force $x\,a$, which would just counterbalance them, or $a\,x$, which would be their *resultant*. That is, a force $G\ E$ thrusting against E with an amount $a\,x$ (or x_{1}) and parallel $a\,x$ would have the same effect on E as the two forces $+ y$ and p. Continuing x_{1} till it intersects the vertical neutral axis through load w at G, we obtain the resultant x_{2} of the two forces acting at G, namely x_{1} and w (see triangle $b\,a\,x$ or II). Similarly we get resultant x_{3} at H, of load $w_{,}$ and x_{2}, (see triangle $c\,b\,x$ or III); also resultant x_{4} at I of load $w_{,,}$ and x_{3} (see triangle $d\,c\,x$ or IV); and finally resultant $+ y$, at F of reaction of q and x_{4} (see triangle $o\,d\,x$ or V). As this resultant is $+ y$ it must, of course, be resisted by a force $- y$ that the whole may remain in equilibrium. By comparing the triangles I, II, III, IV and V, we see that they might all have been drawn in one figure (Fig. 150) for $q + p = w_{,,} + w_{,} + w$, therefore:

$$d\,o + o\,a = d\,c + c\,b + b\,a,$$

further both V and IV contain $d\,x = x_{4}$
" " V " I " $o\,x = y$
" " II " I " $a\,x = x_{1}$
" " II " III " $b\,x = x_{2}$
" " III " IV " $c\,x = x_{3}$

We know further that the respective lines are parallel with each other.

In Fig. 150 then, we have $d\,c = w_{,,}$
$c\,b = w_{,}$
$b\,a = w$
$a\,o = p$ and
$o\,d = q$

The distance $x\,y$ of *pole* x from *load line* $d\,a$ being arbitrary, and the position of pole x the same. The figure $E\ G\ H\ I\ F\ E$ (Fig 149) has many valuable qualities. If at any point K of beam we draw a vertical line $K\ L\ M$, then $L\ M$ will represent (as compared with the other vertical lines) the proportionate amount of bending moment at K. If we measure $L\ M$ in parts of the length of $A\ D$ and measure $x\,y$ (the distance of pole, Fig. 150) in units of the load line $d\,a$, then will the product of $L\ M$ and $x\,y$ represent the actual bending moment at K. That is, if we measure $L\ M$ in inches and — (having laid out $d\,c$, $c\,b$, etc., in pounds) — measure $x\,y$ in pounds, the bending moment at K will be $= x\ y$. $L\ M$ (in pounds-inch.) Similarly at w the bending moment would be

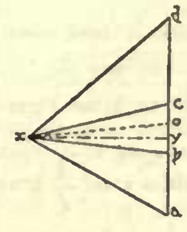


Fig. 150.

$= N\ G.\ x\ y$ (in pounds-inch.)
and at $w_{,}$ it would be $= R\ H.\ x\ y$ " " "
and at $w_{,,}$ it would be $= S\ I.\ x\ y$ " " "
measuring, in all cases, $x\ y$ in pounds and $N\ G$, $R\ H$ and $S\ I$ in inches.

Average Strain on Extreme Fibres. The area of $E\ G\ H\ I\ F\ E$, divided by the length of span in inches will give the average strain for the entire length on extreme top or bottom fibres of beam, providing the

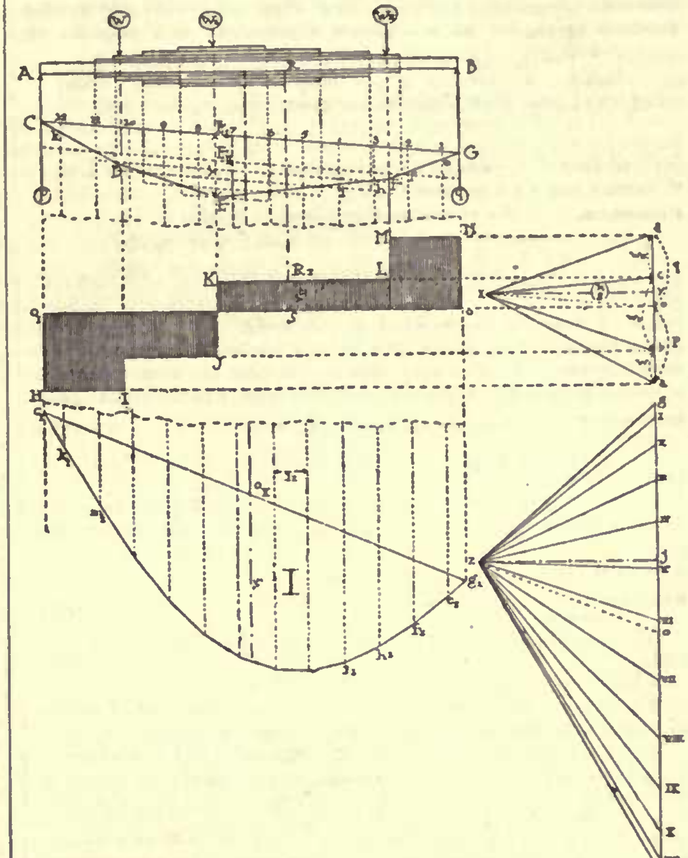


Fig. 151.

beam is of uniform cross-section throughout. The area should be figured by measuring all horizontal dimensions in inches, and all vertical dimensions in parts of the longest vertical ($S\ I$ in our case), this longest vertical being considered $= \left(\frac{c}{f}\right)$ for top, or $\left(\frac{t}{f}\right)$ for bottom fibres, or where these are practically equal $= \left(\frac{k}{f}\right)$.

The greatest bending moment on the beam will occur at the point

GLOSSARY OF SYMBOLS. — The following letters, *in all cases*, will be found to express the same meaning, *unless distinctly otherwise stated*, viz.: —

a = *area*, in square inches.
b = *breadth*, in inches.
c = constant for *ultimate resistance to compression*, in pounds, per square inch.
d = *depth*, in inches.
e = constant for *modulus of elasticity*, in pounds-inch, that is, pounds per square inch.
f = *factor-of-safety*.
g = constant for *ultimate resistance to shearing*, per square inch, across the grain.
g_{1} = constant for *ultimate resistance to shearing*, per square inch, lengthwise of the grain.
h = *height*, in inches.
i = *moment of inertia*, in inches. [See Table I.]
k = *ultimate modulus of rupture*, in pounds, per square inch.
l = *length*, in inches.
m = *moment or bending moment*, in pounds-inch.
n = *constant* in Rankine's formula for compression of long pillars. [See Table I.]
o = the *centre*.
p = the *amount* of the *left-hand re-action* (or support) of beams, in pounds.
q = the *amount* of the *right-hand re-action* (or support) of beams, in pounds.
r = *moment of resistance*, in inches. [See Table I.]
s = *strain*, in pounds.
t = constant for *ultimate resistance to tension*, in pounds, per square inch.
u = *uniform load*, in pounds.
v = *stress*, in pounds.
w = *load at centre*, in pounds.
x, y and z signify *unknown quantities*, either in pounds or inches.
δ = *total deflection*, in inches.
ρ^2 = *square of the radius of gyration*, in inches. [See Table I.]
$\mathfrak{D}$ = *diameter*, in inches.
$\mathfrak{r}$ = *radius*, in inches
π = 3.14159, or, say, 3 1-7 signifies the *ratio of the circumference and diameter of a circle*.

If there are more than one of each kind, the second, third, etc., are indicated with the Roman numerals, as, for instance, a, a_{I}, a_{II}, a_{III}, etc., or b, b_{I}, b_{II}, b_{III}, etc.

In taking moments, or bending moments, strains, stresses, etc., to signify at what point they are taken, the letter signifying that point is added, as, for instance: —

m = moment or bending moment at *centre*.
m_{A} = " " " *point A.*
m_{B} = " " " *point B.*
m_{X} = " " " *point X.*
s = strain at *centre*.
s_{B} = " *point B.*
s_{X} = " *point X.*
v = stress at *centre*.
v_{D} = " *point D.*
v_{X} = " *point X.*
w = load at *centre*.
w_{A} = " *point A.*

[1] Continued from No. 645, page 209.

where the longest vertical can be drawn through the figure. From this figure can also be found the shearing strains and deflection of beam, as we shall see later.

Distance of Pole. If now instead of selecting arbitrarily the distance $x\,y$ of the pole from load line $d\,a$ (Fig. 150) we had made this distance equal the safe modulus of rupture of the material, or $x\,y = \left(\frac{k}{f}\right)$ — measuring $x\,y$ in pounds at same scale as the load line $d\,a$ — it stands to reason that any vertical through the Figure $E\,G\,H\,I\,F\,E$ (Fig. 149) measured in inches, will represent the required moment of resistance, for if $L\,M.\,x\,y = m$, we know from Formula (18), that $m = r.\left(\frac{k}{f}\right)$ and as we made $x\,y = \left(\frac{k}{f}\right)$, we have, inserting values in above:

$$L\,M.\left(\frac{k}{f}\right) = r.\left(\frac{k}{f}\right) \text{ or}$$

$$L\,M = r$$

Having thus shown the basis of the graphical method of analyzing transverse strains, we will now give the actual method without wasting further space on proofs.

Several Concentrated Loads. If there are three loads w, w_1 and w_{11} on a beam $A\,B$ (Fig. 151) we proceed as follows: at any convenient scale — to be known as the pounds-scale — lay off in pounds, $d\,c = w_{11}$; also $c\,b = w_1$ and $b\,a = w$. Let $A\,B = l$ measured in inches — this scale being called the inch-scale. Now select pole x at random,

Strain Diagram. but at a distance (measured with pounds-scale) $x\,y = \left(\frac{k}{f}\right)$ = the safe modulus of rupture of the material. Draw $x\,d$, $x\,c$, $x\,b$ and $x\,a$. Now begin at any point G of reaction q, draw $G\,F$ parallel $d\,x$, till it intersects vertical w_{11} at F: then from F draw $F\,E$ parallel $c\,x$ to vertical w_1: then draw $E\,D$ parallel $b\,x$ to vertical w; and then $D\,C$ parallel $a\,x$ to reaction p. From C draw $C\,G$, and through x draw $x\,o$ parallel $C\,G$.

Reactions. We now have the following results:

$o\,d$ = reaction q (measured with pounds-scale.)

$a\,o$ = " p " " "

any *vertical* through figure $C\,D\,E\,F\,G\,C$, (measured with inch-scale) gives the amount of r = required moment of resistance in inches, at point of beam where vertical is measured. The longest vertical passes through the point of greatest bending-moment in beam. Multiply any vertical (in inches) with $x\,y$ (in pounds) to obtain amount of bending-moment at point of beam through which vertical passes.

Moment of Resistance. or we should have: $r = v$ (92)

Where r = the required moment of resistance, in inches, at any point of beam.

Where v = the length (measured with inch-scale) of the vertical through upper figure $C\,D\,E\,F\,G\,C$ at point of beam for which r is sought.

And further:

Bending-moment. $m = v.\,x\,y$ (93)

Where m = the bending moment at any point of beam in pounds-inch.

Where v = the same value as in Formula (92)

Where $x\,y$ = the length, (measured with pound-scale) of distance of pole x from load line, in upper strain diagram $x\,a\,d$.

If now we draw horizontal lines through d, c, b and a; and through $o\,a$ horizontal line for horizontal axis; and continue these lines until they intersect their respective load verticals w_{11}, w_1 and w, the shaded figure $O,\,H\,I\,J\,K\,L\,M\,N\,O\,O_1$ will give the vertical shearing strain along beam. Any vertical (as $R_1\,S$) drawn through this figure to horizontal axis and measured with pounds-scale, gives the amount of vertical shearing at the point of beam (R) through which vertical is drawn.

Or

Vertical Cross-shearing. $s = v_{11}$ (94)

Where s = the amount of vertical shearing strain in pounds, at any point of beam.

Where v_{11} = the length (measured with pounds-scale) of vertical through figure $O_1\,H\,I\,J\,K\,L\,M\,N\,O\,O_1$ dropped from point of beam for which strain s is sought.

We now divide $G\,C$ into any number of *equal* parts — say twelve in our case — and begin with a half part, or

G to $1 = 12$ to $C = \frac{1}{24}.\,G\,C$; also

1 to 2 = 2 to 3 = 3 to 4 = 4 to 5, etc. $= \frac{1}{12}.\,G\,C$

and make the new lower load line $g\,c$ with inch-scale so that

Deflection Diagram. g to I = length of vertical 1 e

further I to II = length of vertical 2 f

" II " III = " " " 3 h

" III " IV = " " " 4 i, etc. until

" XII " c = " " " 12 k

Now select arbitrarily a pole z at any distance $z\,j$ from load line $g\,c$.

Now draw anywhere's below the beam where convenient (say I. Fig. 151) beginning at g_1, the line $g_1\,e_1$ parallel $g\,z$ till it intersects the prolongation of $l\,e$ (from above) at e_1; then draw $e_1\,f_1$ parallel I z till it intersects vertical 2 f at f_1; and similarly draw $f_1\,h_1$ parallel II z; also $h_1\,i_1$ parallel III z, etc., to $m_1\,k_1$ parallel XI z and finally $k_1\,c_1$ parallel $c\,z$. The more parts (l_1) we divide the beam into, the nearer will this line $g_1\,e_1\,f_1\,m_1\,k_1\,c_1$ approach a curve. The real line to measure deflections would be a curve with the above lines as tangents to it; we need not, however, bother to draw this curve for practical work. Now draw $c_1\,g_1$ and parallel thereto $z\,o$. Divide $g_1\,c_1$ at o_{11} so that[1]: $g_1\,o_{11}: c_1\,o_{11} = c\,o: g\,o$, then will o_{11} be the point of greatest deflection along beam. This will be further proven by the fact that the greatest vertical (in lower figure I) will pass through o_{11}, if the real curve were drawn. The figure $g_1\,e_1\,f_1\,h_1\,i_1\,m_1\,k_1\,c_1\,g_1$ will measure the amount of deflection of beam at all points of beam. The deflection at any point of beam being proportionate to length of its vertical through lower figure I. The *amount* of this deflection will be

Amount of Deflection, Definite Pole Distance.

$$\delta = \frac{v_1.\,l_1.\,z\,j.\left(\frac{k}{f}\right)}{e.\,i.} \qquad (95)$$

Where δ = the deflection, in inches, at any point of beam, if pole distance of upper strain diagram $(x\,y) = \left(\frac{k}{f}\right)$.

Where v_1 = the length of vertical, in inches, dropped from said point through lower figure I (see Fig. 151)

Where l_1 = the length, in inches, of each equal part 1 to 2, 2 to 3, 3 to 4, etc., into which beam was divided, [in our case $l_1 = \frac{1}{12}\,l$.]

Where i = the moment of inertia, of cross-section at said point, in inches.

Where $z\,j$ = the distance (measured with inch-scale) of pole z from load lines in lower strain diagram.

Where $\left(\frac{k}{f}\right)$ = the safe modulus of rupture, per square-inch, of the material.

Where e = the modulus of elasticity, in pounds-inch, of the material.

If we were to so proportion the beam that the moment of resistance at each point would exactly equal the required moment of resistance as found above, we should have:[2]

Deflection varying Cross-section.

$$\delta = \frac{v_1.\,l_1.\,z\,j.\left(\frac{k}{f}\right)}{v.\,\frac{d}{2}.\,e} \qquad (96)$$

Where $\delta, v_1, z\,j, \left(\frac{k}{f}\right)$, e and l same value as in Formula (95).

Where v = length of corresponding vertical in upper figure $C\,D\,E\,E\,G\,C$, (to vertical v_1 of lower Fig. I) to be measured in inches.

Where $\frac{d}{2}$ = one-half the total depth of beam, in inches.

Had we not made $x\,y = \left(\frac{k}{f}\right)$, we should have

Deflection Pole Distance arbitrary.

$$\delta = \frac{v_1.\,l_1.\,z\,j.\,x\,y.}{e.\,i.} \qquad (97)$$

Where δ, v_1, l_1, e, $z\,j$, and i same value as in Formula (95).

Where $x\,y$ = the length of pole distance from load line in upper strain diagram, measured in pounds.

The same formulæ and methods could be applied to cantilevers, but for these the arithmetical calculations are so very simple that it would be taking unnecessary trouble.

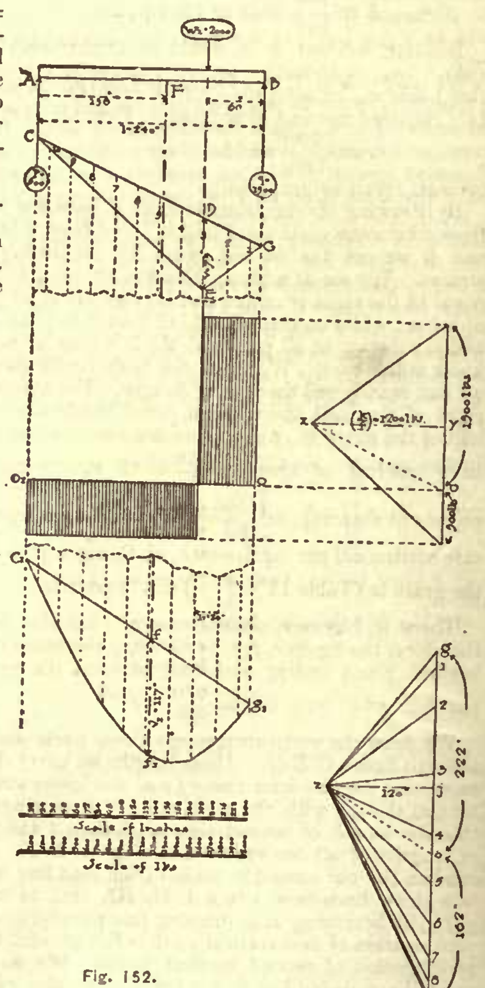


Fig. 152.

A few practical examples will make all of the foregoing more clear.

[1] This would be the greatest possible deflection. If the beam were not so proportioned, but of uniform cross-section throughout, the deflection would be less.

[2] Note that the division of the line $g_1\,o_{11}\,c_1$ is the reverse of the division of the line $g\,o\,c$.

Example I.

Single concentrated Load. *A Georgia pine girder A B of 20-foot span carries a load w_1 of* 2000 *pounds* 5′ 0″ *from right reaction B. What size should the girder be?*

We draw (Figure 152) A $B = 240''$ at inch-scale, and locate w_1 at 60″ to the left of B. Now draw a vertical line b $a = 2000$ pounds at pounds-scale. Select point x anywhere, but distant x $y = 1200$ pounds. (1200 pounds being $= \left(\frac{k}{f}\right)$ or the safe modulus of rupture, per square-inch, of Georgia pine). Draw x b and x a. Draw verticals through A, w_1 and B. On vertical A begin at any point C, draw C E parallel x a, till it intersects verticals w_1 at E; then draw E G till it intersects vertical B at G. Draw G C and o x parallel to G C. We scale o b, it scales 1500 pounds, so this, is the reaction at B. We scale a o, it scales 500 pounds and this is the reaction at A. The longest vertical through C E G is vertical w_1, therefore greatest bending-moment is at w_1 which we know is the case. We scale E D at inch-scale, it scales 75 inches, therefore the (greatest) *required* moment of resistance will be at w_1 and will be Formula (92).

$$r = 75.$$

From Table I, section No. 2, we know for rectangular beams,

$$r = \frac{b.\,d^2}{6}, \text{ therefore:}$$

$$\frac{b.\,d^2}{6} = 75, \text{ or}$$

$$b.\,d^2 = 450.$$

We will suppose the girder is not braced sideways, and needs to be pretty broad; let us try $l = 5''$, we have then:

$$5.\,d^2 = 450 \text{ or}$$

$$d^2 = \frac{450}{5} = 90 \text{ and}$$

$$d = 9,5'' \text{ or the girder}$$

would have to be 5″ x 9½″ or say 5″ x 10″. The bending-moment at w_1 is, of course, Formula (93) $= E$ $D.$ x $y = 75.1200 = 90000$ (pounds-inch).

Had we calculated arithmetically, we should have had, Formulæ (14) and (15):

$$\text{reaction } A = \frac{60}{240}.\,2000 = 500 \text{ pounds.}$$

$$\text{“} \quad B = \frac{180}{240}.\,2000 = 1500 \text{ pounds.}$$

Bending moment at w_1 would be (right side) Formulæ (23) and (24). $m_{w_1} = 1500.60 - 0.2000 = 90000$ (pounds-inch) or check (left) side $m_{w_1} = 500.180 - 0.2000 = 90000$ (pounds-inch.) Therefore required moment of resistance, Formula (18)

$$r = \frac{90000}{1200} = 75.$$

or same result as graphically.

By drawing the horizontals from b between verticals B and w_1; from a between verticals A and w_1; and from o between verticals A and B we get the etched figure for measuring vertical shearing strains. We see at a glance that the shearing to the right of load is equal to the right reaction, and is constant at all points of right side of beam; while on the left side of load it is equal to the left reaction, and is constant at all points of the left side of beam. And this we know is the case. We need not bother with shearing, however, for we can readily see there is no danger. For even immediately to the right of the load, the weakest point in our case, we know that one-half of the fibres of cross-section are not strained at all, or we should have one-half of area or $\frac{5.10}{2} = 25$ square-inches to resist 1500 pounds of shearing, or $\frac{1500}{25} = 60$ pounds per square-inch, while the safe resistance, per square-inch, of Georgia pine to shearing across the grain is (Table IV) $\left(\frac{g}{f}\right) = 570$ pounds.

There is, however, some danger of excessive deflection; we draw, therefore, the figure $c_1 f_1 g_1$ by dividing the beam into ten equal parts, beginning and ending with half parts at the reaction, (each whole part being 24″ long, or $l_1 = \frac{240}{10} = 24''$)

We draw the verticals through these parts and get their lengths through figure C E G. These lengths we carry down in their proper succession on the load line g j c of the lower strain diagram, beginning at the top with the right vertical 1, putting immediately under this the length of second vertical 2, then 3 and so on till g $c =$ sum of lengths of all ten verticals through C E G. We now select z at random (in our case 120 inches from load line or z $j = 120''$). We now draw lines from z to g I, II, III, etc., to c. Construct figure $g_1 f_1 c_1$ by beginning at g_1 drawing line parallel to z g until it intersects prolongation of first vertical 1; then line parallel to z I till it intersects prolongation of second vertical 2, etc. We now draw z o parallel c_1 g_1. We scale g o and find it scales 222″, also c o which scales 162″; we divide c_1 g_1 at f_1 so that

$$c_1 f : f g_1 = 222 : 162.$$

Carrying vertical $f f_1$ through figure we find it scales $(v_1) = 117''$ continuing $f f_1$ up to beam it gives us point F as the point of greatest deflection, we find A F scales 138″. Had we used Formula (43) we should have located F at a distance from A or A $F = \sqrt{\frac{240^2 - 60^2}{3}}$ $= 134,17''$. So that we have a sufficiently accurate result.

For the amount of deflection at F we use Formula (95); we know that (Table I, Section No. 2) $i = \frac{b.\,d^3}{12} = \frac{5.\,10^3}{12} = 417$, further for Georgia pine $\left(\frac{k}{f}\right) = 1200$ pounds.

$$e = 1200000 \text{ (inch-pounds.)}$$

$$l_1 = 24''$$

$$v_1 = f f_1 = 117''$$

$$z j = 120'', \text{ therefore:}$$

$$\delta = \frac{117.\,24.\,120.\,1200}{1200000 \quad .417}$$

$$= 0,808''$$

Had we calculated the deflection by Formula (41) we should have had:

remembering that $m = 180''$ and $n = 60''$ and $l + n = 240 + 60 = 300''$

$$\delta = \frac{2000.\,180.\,60.\,300}{9.\,240.\,1200000.\,417}.\ \sqrt{\frac{180.\,300}{3}}$$

$$= 0,803''$$

Which proves the accuracy of the graphical method.

For a beam of 20 feet span the deflection not to crack plastering should not exceed, Formula (28).

$$\delta = 20.\,0,03 = 0,6''$$

Therefore, if our beam supports a plastered ceiling, it must be re-designed to be *stiffer*. Either made deeper, in which case it can be

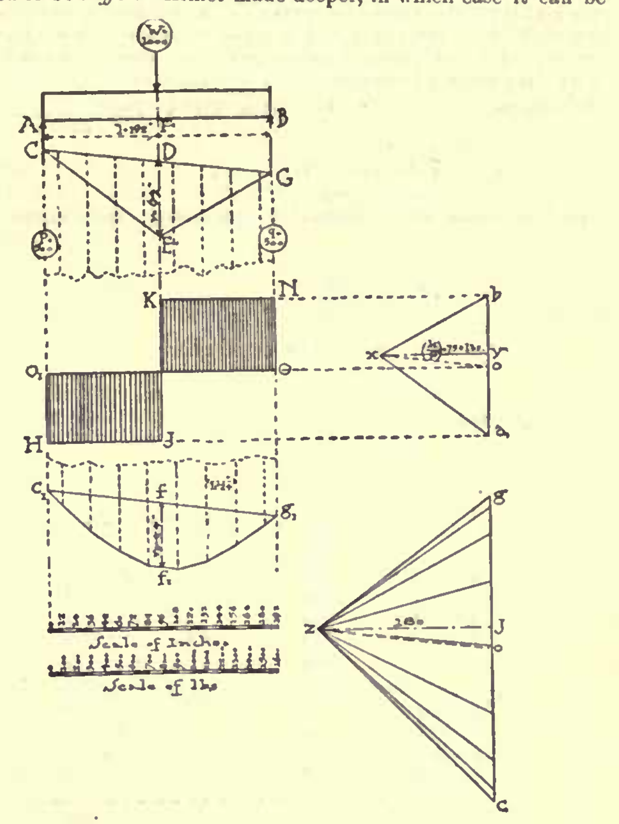


Fig. 153.

thinner, if braced sideways, or it can be thickened sufficiently to reduce the deflection, see Formula (31).

Example II.

Single centre load. *A hemlock girder A B (Fig. 153) of 16-foot span, carries a centre load w of* 1000 *pounds. What size should the girder be?*

We make A $B = 192''$ at inch scale; locate w at its centre F; make b a at any scale — (pounds-scale) — equal 1000 pounds. Select pole x distant, x $y = 750$ pounds, from load line b a, (as 750 pounds $= \left(\frac{k}{f}\right)$ the safe modulus of rupture per square inch of hemlock). Draw x b and x a. Begin at G, draw G E parallel b x to vertical through load, and then draw E C parallel a x. Draw C G and then x o parallel C G, we find that o bisects b a or a $o = o$ $b = 500$ pounds. Each reaction is therefore one-half of the load; this we know is the case. Greatest line through C G E we find is at D E, so that greatest bending-moment is at load; this we know is the case. D E scales 64″ at inch-scale, therefore the required moment of resistance for the beam is, Formula (92):

$$r = 64.$$

and the greatest bending-moment at load, Formula (93):

$m_w = 64.\ xy = 64.750$
$= 48000$

Had we calculated arithmetically we should have obtained the same results, for Formula (22)

$$m_w = \frac{1000.\ 192}{4} = 48000$$

and Formula (18):

$$r = \frac{48000}{750} = 64$$

Now from Table I, Section No. 2, we know that for rectangular sections:

$$r = \frac{b.d^2}{6} \text{ or}$$

$$b.d^2 = 64.6 = 384.$$

If we assume the beam as 4″ thick, we have then:

$$4.\ d^2 = 384.$$

$$d^2 = \frac{384}{4} = 96 \text{ or}$$

$d = \sqrt{96} = 9{,}8''$ or we will make the beam 4″ x 10″.

We draw the figure $O_1\ H\ J\ K\ N\ O$ for shearing and find it is constant throughout the whole length of beam and equal to length $O_1\ H$ or $N\ O$ measured at pounds scale, or 500 pounds. This is so small we need not bother with it.

To obtain the deflection diagram we divide $G\ C$ into eight equal parts, each part $l_1 = \frac{192}{8} = 24''$ and begin at each end with half parts, drawing the eight verticals through $C\ E\ G$.

We lay off their exact lengths in proper succession on the lower load line $g\ c$, beginning at the top with the right vertical. Select pole z at random, in this case distant from load line $z\,j = 180''$. We now draw the figure $c_1\ g_1\ f_1$ and find greatest deflection is at its centre $f\,f_1$; for $z\ o$ parallel $c_1\ g_1$ bisects $g\,c$. We scale $f\,f_1$ at inch scale $= 44''$, therefore greatest deflection of beam at centre, Formula (95), remembering that (Table I, Section No. 2) $i = \frac{4.10^3}{12} = 333$ and (Table IV) $e = 800000$

$$\delta = \frac{44.\ 24.\ 180.\ 750}{800000\ .333} = 0{,}535''$$

Had we calculated the deflection arithmetically from Formula (40)

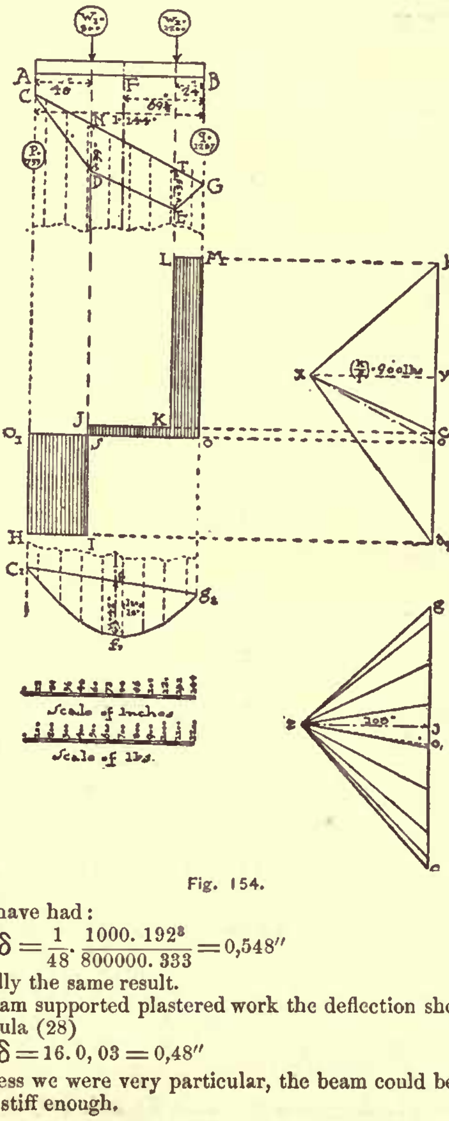


Fig. 154.

we should have had:

$$\delta = \frac{1}{48} \cdot \frac{1000.\ 192^3}{800000.\ 333} = 0{,}548''$$

or practically the same result.

If the beam supported plastered work the deflection should not exceed, Formula (28)

$$\delta = 16.\ 0,\ 03 = 0{,}48''$$

Still, unless we were very particular, the beam could be passed as practically stiff enough.

Example III.

Two concentrated loads. *A white pine beam A B Fig.* 154, *of* 12*-foot span carries two loads, one* $w_1 = 800$ *pounds, four feet from left support, the other* $w_{11} = 1200$ *pounds, two feet from right support. What size should the beam be?*

Make $A\,B$ at inch scale $= 144$ inches, locate w_1 so that $A\ w_1 = 48''$, and w_{11} so that $B\ w_{11} = 24''$. At any (pounds scale) make $b\,c = 1200$ pounds and $c\,a = 800$ pounds. Select pole x distant from $b\,a$; $x\,y = 900$ pounds, the safe modulus of rupture per square inch of white pine; draw $x\,b$, $x\,c$ and $x\,a$. Construct $C\,D\,E\,G$ parallel to these lines. Draw $C\,G$, and parallel to same $x\,o$, then will $a\,o = 733$ pounds be reaction at A, and $o\,b = 1267$ pounds be reaction at B. We scale vertical $D\,N$ at $w_1 = 39''$ and $T\,E$ at $w_{11} = 35''$, therefore greatest bending-moment is at w_1 and Formula (93)

$$m_{w_1} = 39.\ 900 = 35100$$

Further, the required moment of resistance at w_1 Formula (92) will be:

$$r = D\,N = 39.$$

Now from Table I, Section No. 2,

$$r = \frac{b.d^2}{6}, \text{ or}$$

$$b.d^2 = 6.39 = 234.$$

Now if $b = 3''$ we should have

$$d^2 = \frac{234}{3} = 78 \text{ and}$$

$d = \sqrt{78} =$ say 9″, or the beam would need to be 3″ x 9″.

We should have obtained practically the same results arithmetically, for: Formulæ (16) and (17):

$$\text{Reaction at } A = \frac{800.96}{144} + \frac{1200.24}{144} = 733.$$

$$\text{Reaction at } B = \frac{800.48}{144} + \frac{1200.120}{144} = 1267$$

check: $A + B = w_1 + w_{11} = 800 + 1200 = 2000$ pounds and $733 + 1267 = 2000$ pounds.

Beginning at B we have to pass over load w_{11} (1200 pounds) and on to w_1, before passing amount of reaction B (1267 pounds) therefore greatest bending-moment at w_1. We know from Formula (24) it would be:

$$m_{w_1} = 1267.96 - 72.1200 = 35232$$

and check from Formula (23)

$$m_{w_1} = 733.48 - 0.800 = 35184$$

being near enough for practical purposes. From Formula (18) we should have had:

$$r = \frac{35184}{900} = 39{,}09$$

We now draw the shearing diagram $O_1\ H\ I\ J\ K\ L\ M\ O$, as shown in Figure 154, and find the amount of shearing
from A to $w_1 = O_1\ H =$ 733 pounds,
from w_1 to $w_{11} = J\ S =$ 67 pounds,
from w_{11} to $B = M\ O =$ 1267 pounds.

We can overlook it, for even at the weakest point of beam for resisting cross-shearing we have half the area, or $\frac{3.9}{2} = 13\frac{1}{2}$ square inches.

White pine will safely resist 250 pounds per square inch in cross-shearing (Table IV) or the beam would resist.

$13\frac{1}{2}.\ 250 = 3375$ pounds at its weakest point for cross-shearing, (viz.: at w_1) and twice as much at the reactions.

To find the deflection we divide $G\ C$ into eight equal parts, beginning with half parts (or $l_1 = \frac{144}{8} = 18''$) and draw the verticals through $C\ D\ E\ G$. We now make the lower load line $g\ c$ equal the sum of these verticals, beginning at the top with the right vertical.

Select z distant from $g\ c$ (the load line) $z\,j = 108''$. Draw $z\,g$, $z\,c$, etc., and construct $g_1\ c_1\ f_1$ as before.

We draw $z\ o$ parallel $c_1\ g_1$. Now $g\ o$ measures 116 inches and $o\ c$ 108 inches, therefore divide $c_1\ g_1$ at f so that:

$$c_1 f : f\,g_1 = 116 : 108$$

Carrying the vertical $f\,f_1$ up to point F of beam, we find the point of greatest deflection F, where

$$B\ F = 69\tfrac{1}{2}'' \text{ and } A\ F = 74\tfrac{1}{2}''$$

We find $f\,f_1$ scales 42″, remembering that (Table I, Section No. 2) $i = \frac{3.9^3}{12} = 182$, and that for white pine Table IV $e = 850000$ pounds we have Formula (95):

$$\delta = \frac{42.\ 18.\ 108.\ 900}{850000\ .182} = 0{,}475''$$

Had we attempted to get this result arithmetically by inserting the values in Formula (41) (and remembering that n is always the nearer support, or in our case respectively 48″ and 24″, while m respectively 96″ and 120″) we should realize the advantage of the graphical method, for:

$$\delta = \frac{800.\ 96.\ 48.\ (144+48).\sqrt{\frac{96.\ (144+48)}{3}} + 1200.\ 96.\ 48.\ (144+24).\sqrt{\frac{120.\ (144+24)}{3}}}{9.\ 144.\ 850000.\ 182}$$

If we figure out the above tedious formula we should have

$$\delta = 0{,}422''$$

or practically the same result as we obtained graphically.

[illegible]

Hence [illegible] over load [illegible] (pounds) and on [illegible] amount of reaction R [illegible] (pounds) the [illegible] greatest bending moment at [illegible]. We know from Formula (24) [illegible]

[illegible] = 45323

[illegible] being [illegible] for practical purposes. From Formula ([illegible]) we [illegible]

[illegible] as shown

[illegible] point of beam [illegible] = [illegible] square [illegible]

[illegible] pounds per square inch [illegible] (Table [illegible]) [illegible] cross-bearing, [illegible]

[illegible] and draw [illegible] [illegible] the [illegible] measures 116 inches and [illegible] inches [illegible]

[illegible] we find the point of greatest deflection [illegible]

We find [illegible] (Table I, Section No. 3) [illegible] and that for white pine Table IV [illegible] = 850000 pounds we have Formula ([illegible]):

$$\delta = [illegible] = 0.276''$$

Had we attempted to get this result arithmetically by inserting the values in Formula (41) (and remembering that x is always the nearer support, [illegible] case respectively 15'' and 26'', while [illegible] respectively [illegible] and [illegible]) we should realize the advantage of the graphical method, [illegible]

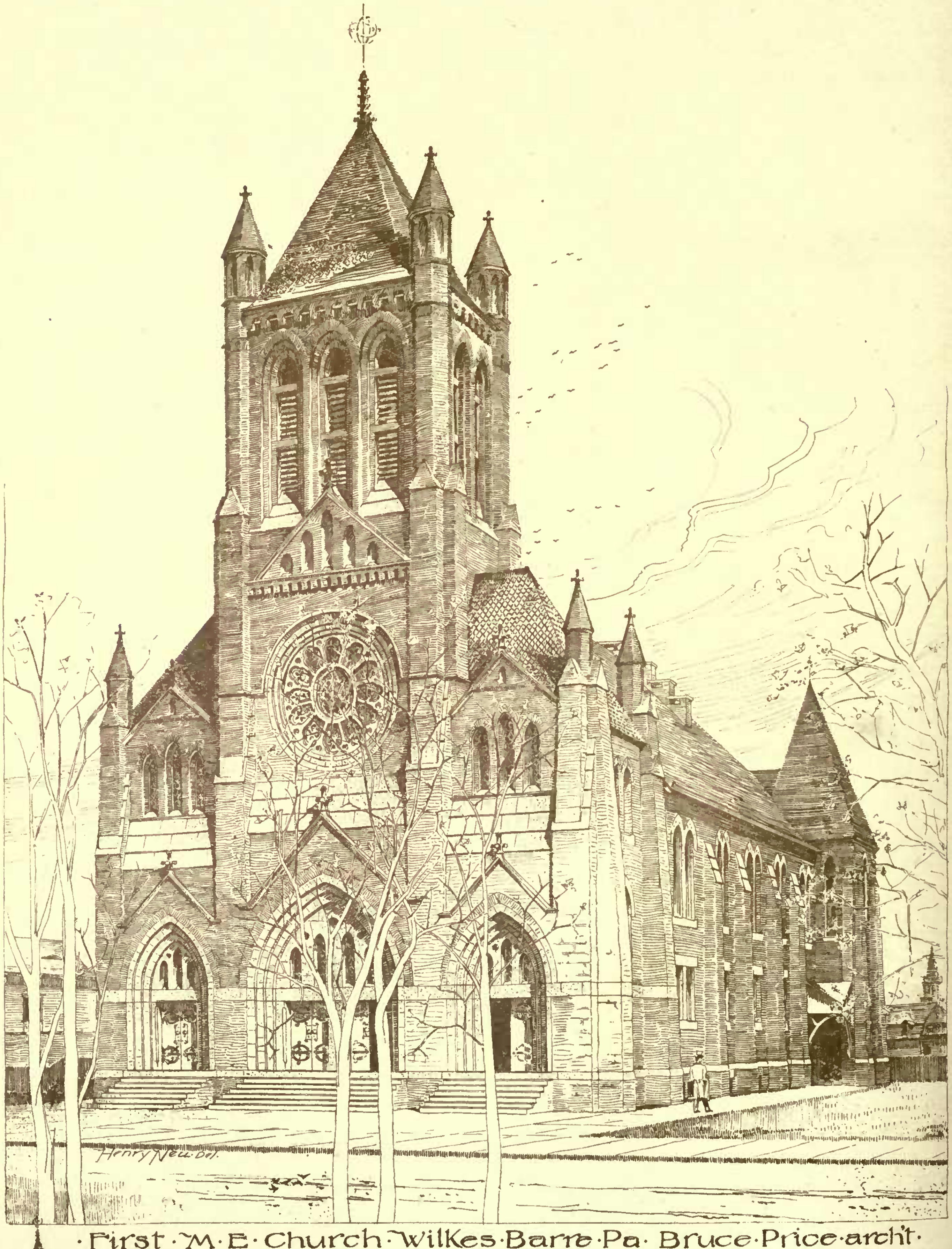
[illegible]

If [illegible] formula we should have

$$\delta = 0.42[illegible]$$

[illegible] practically the same result as we obtained graphically.

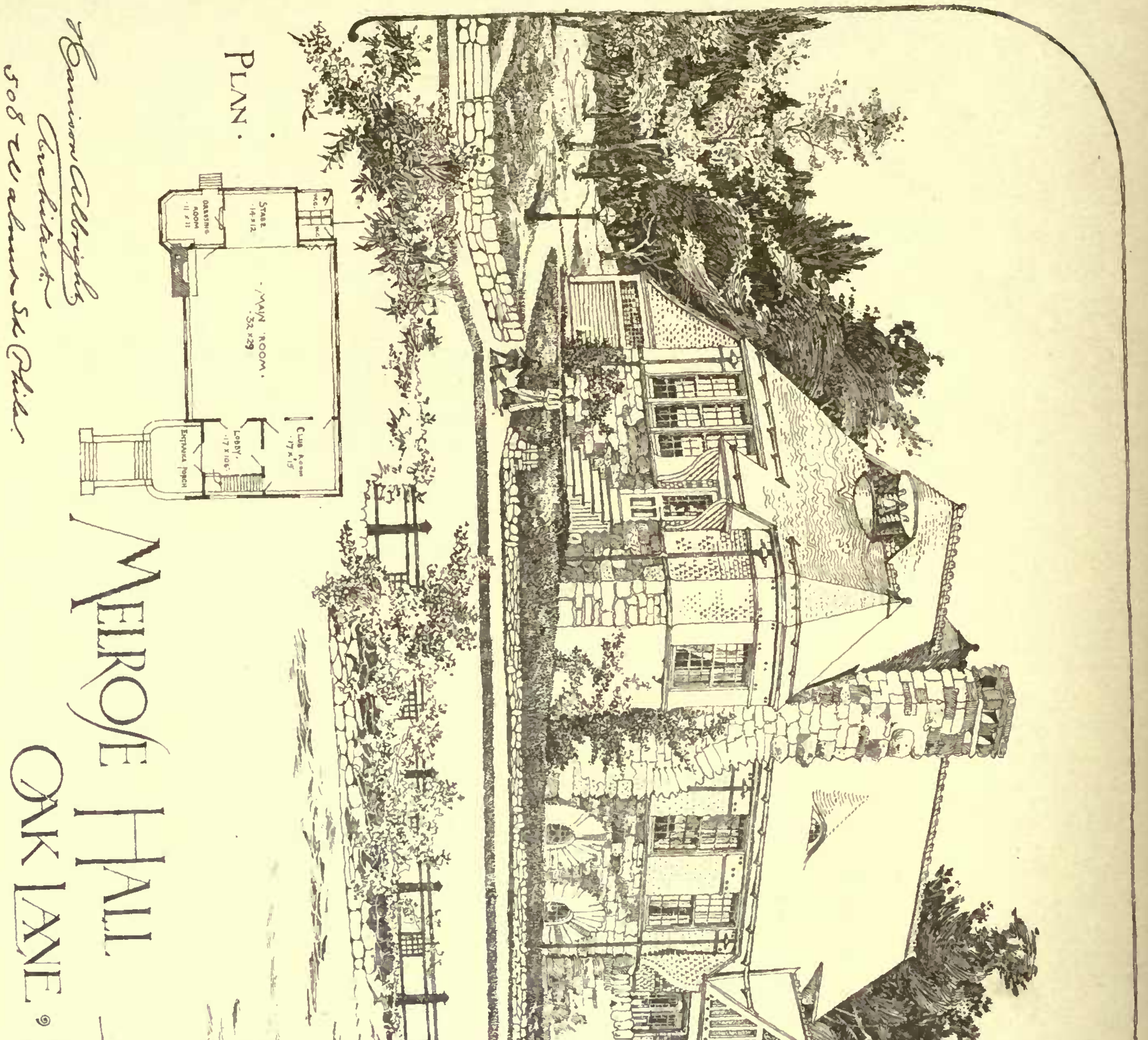
COPYRIGHT 1888 BY TICKNOR & CO



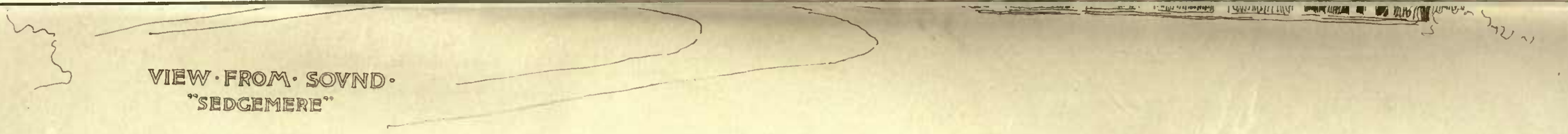
·First·M·E·Church·Wilkes·Barre·Pa· Bruce·Price·arch't·

Heliotype Printing Co. Boston.

COPYRIGHT 1888 BY TICKNOR & Co

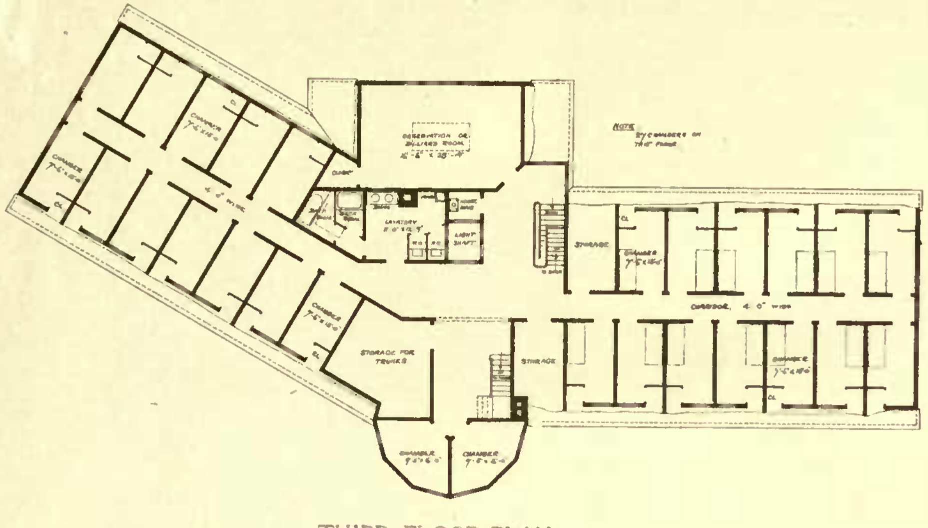


Heliotype Printing Co. Boston.

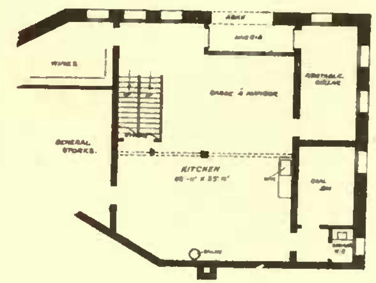


VIEW · FROM · SOVND ·
"SEDGEMERE"

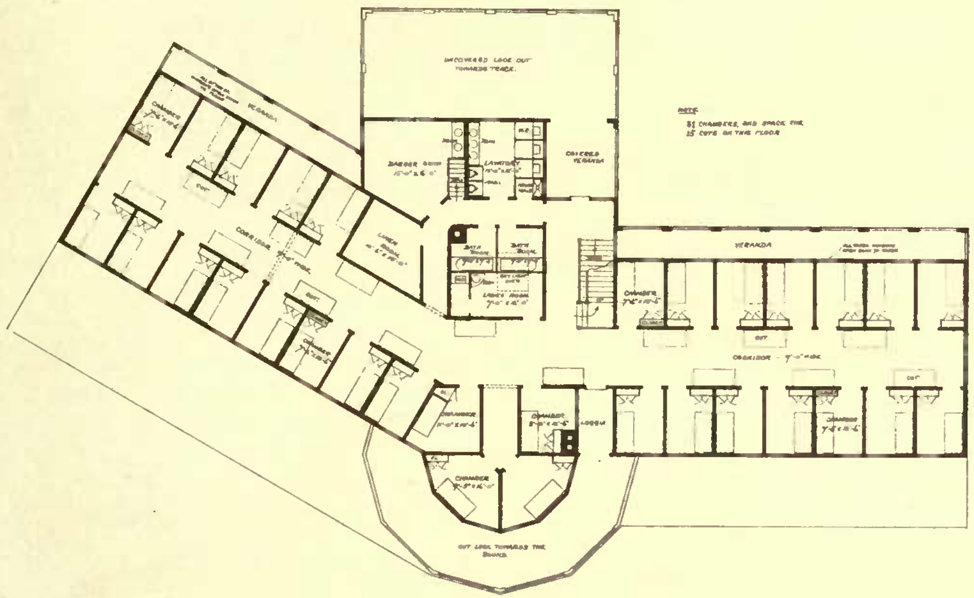
· DESIGN · FOR · N · Y · ATHLETIC · CLVB'S ·
· COVNTRY · CLVB · HOVSE ·
· GEORGE · MARTIN · HVSS · ARCHITECT ·



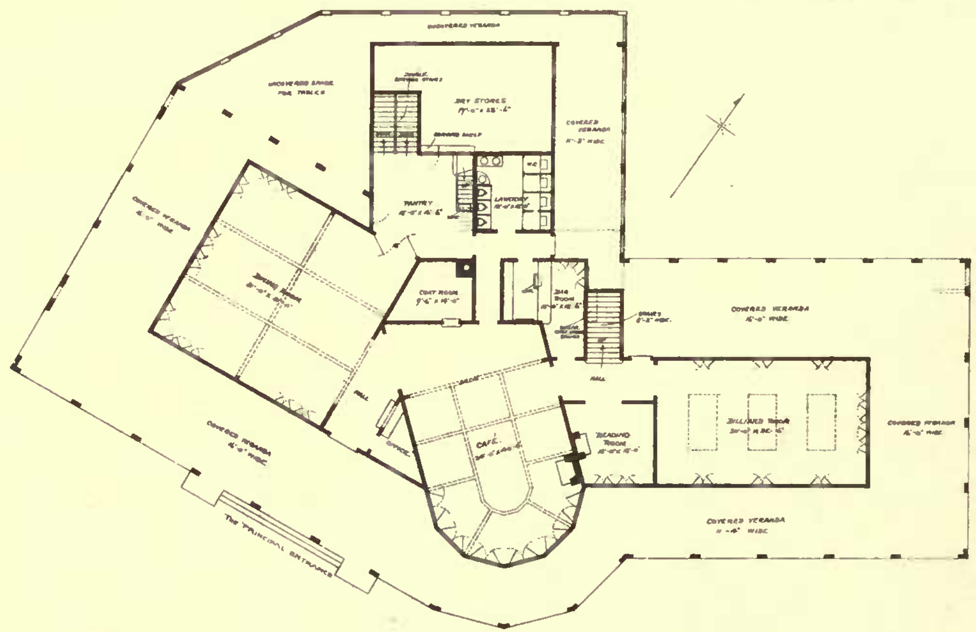
THIRD · FLOOR · PLAN ·



SERVICE PORTION UNDER WING



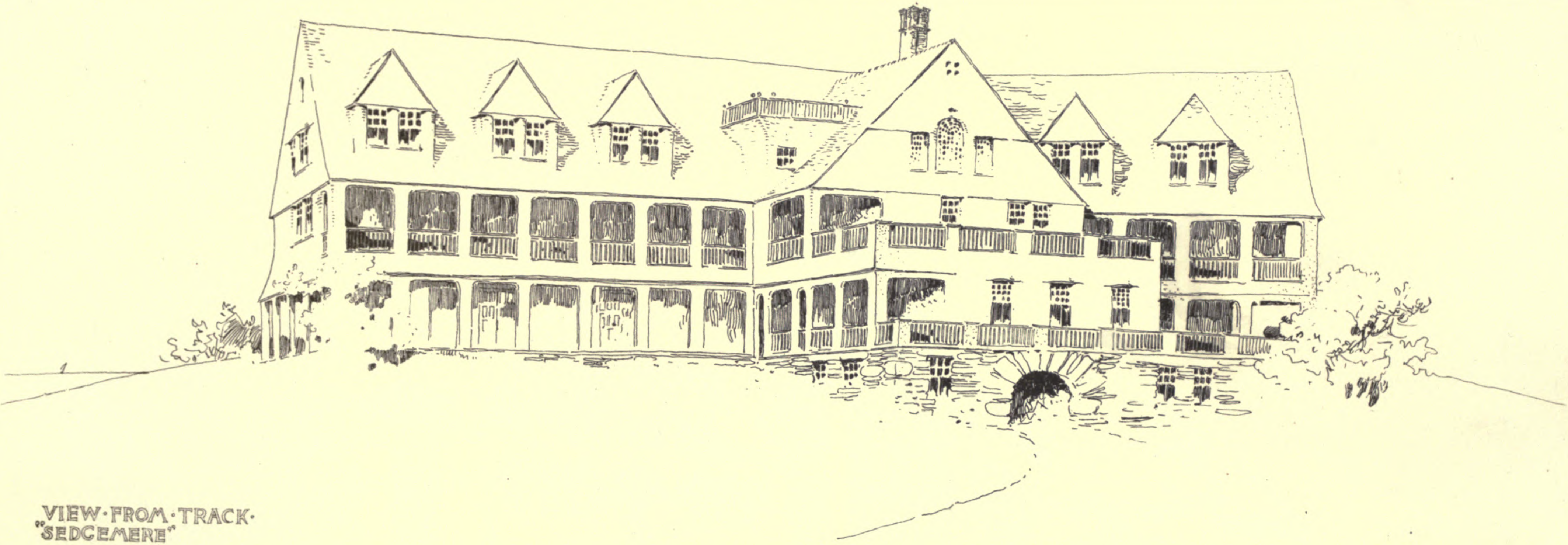
SECOND · FLOOR · PLAN ·



FIRST · FLOOR · PLAN ·

Heliotype Printing Co. Boston

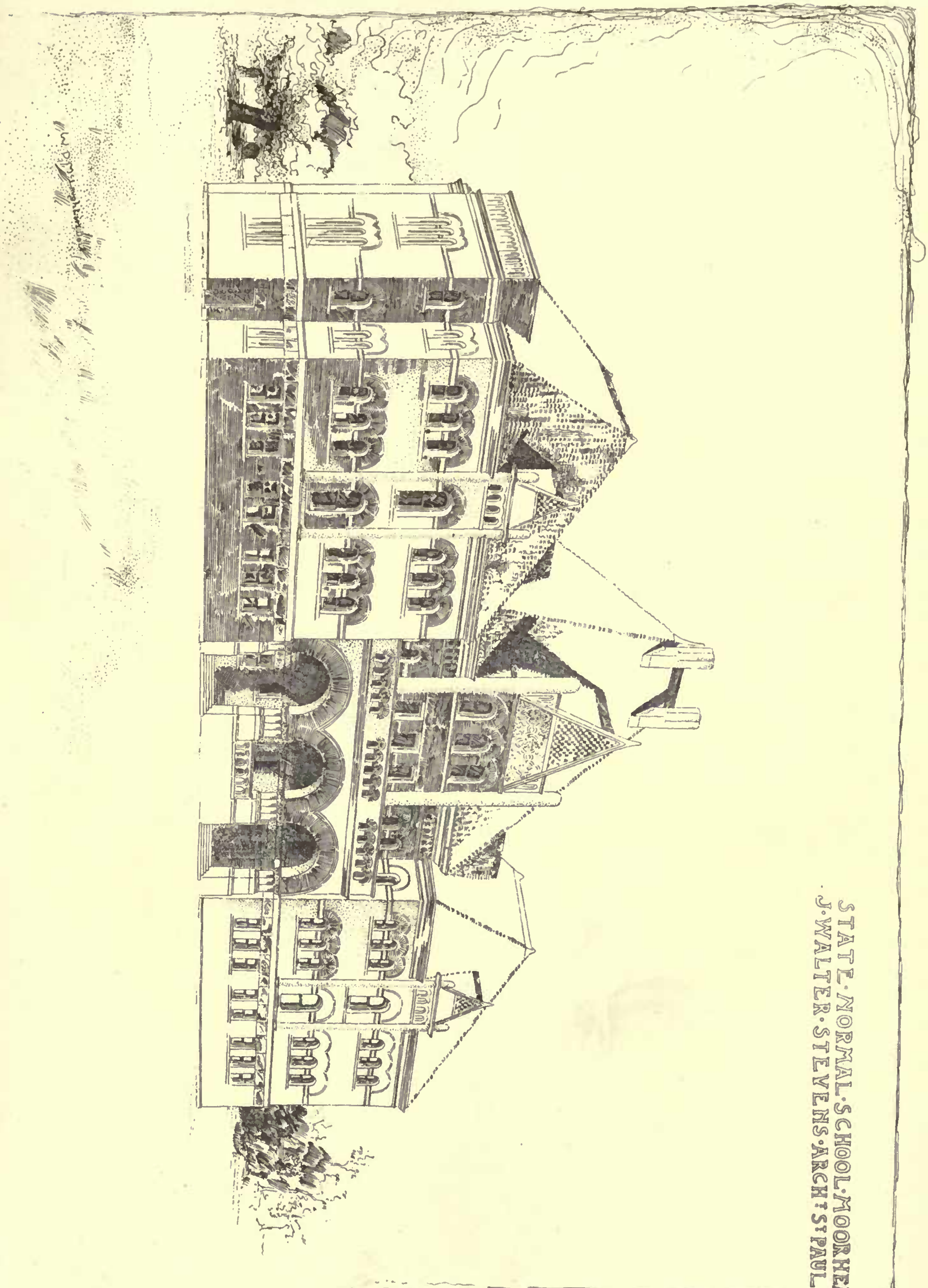
COPYRIGHT 1888 BY TICKNOR & Co



VIEW·FROM·TRACK·
"SEDGEMERE"

AMERICAN ARCHITECT AND BUILDING NEWS, JUNE. 2 1888 No. 649

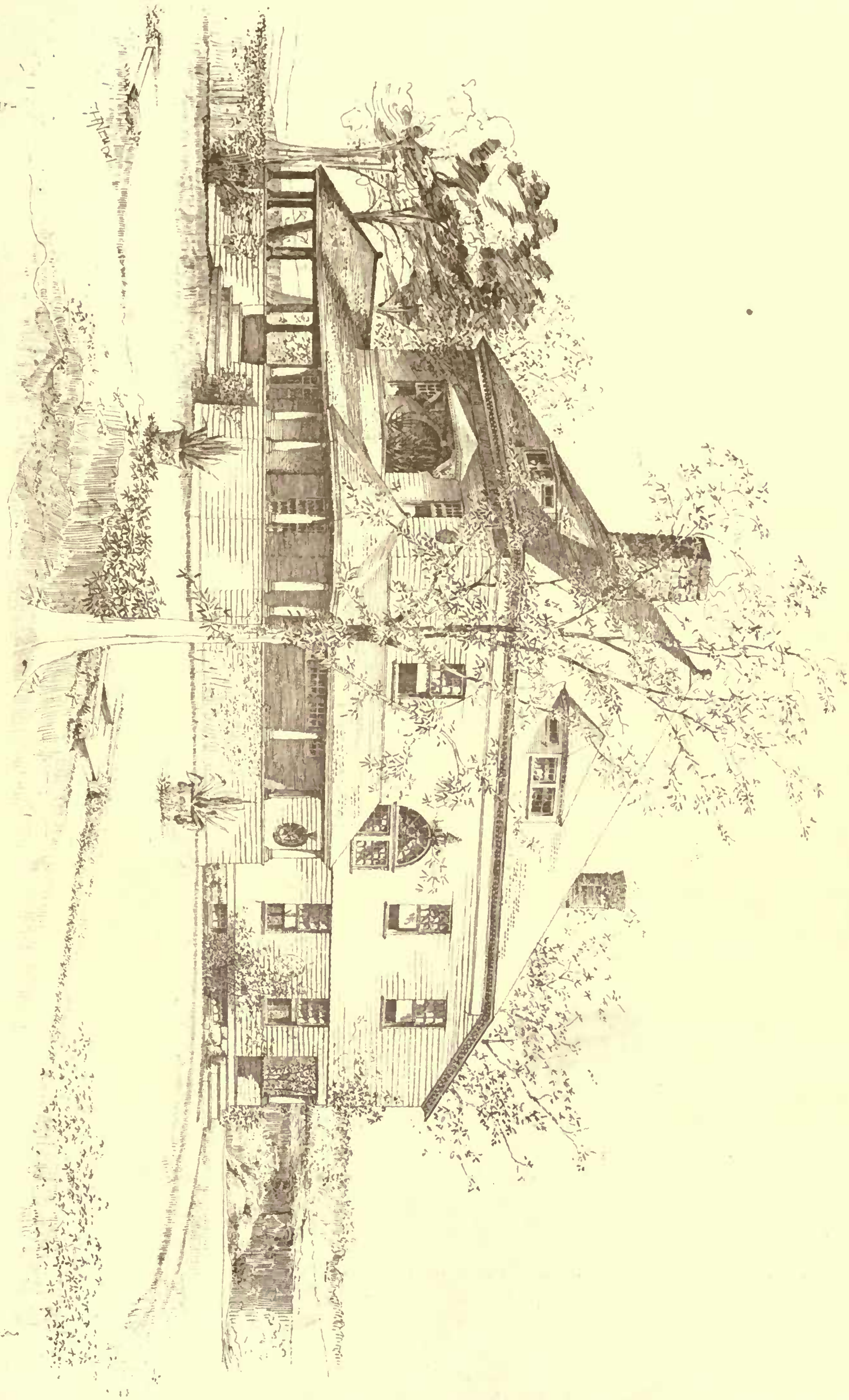
COPYRIGHT 1888 BY TICKNOR & CO.



STATE·NORMAL·SCHOOL·MOORHEAD
·J·WALTER·STEVENS·ARCH'T ST PAUL·

Heliotype Printing Co. Boston.

COPYRIGHT 1888 BY TICKNOR & CO



·Residence· of· Brander· Matthews· Esq: "Shingle-Nook" ·Narragansett· Pier· R.I.—Geo. A. Freeman. Jr. Archt. 52 Broadway. N.Y.

Heliotype Printing Co. Boston

The safe deflection, were the beam to carry plastering, should not exceed Formula (28)

$$\delta = 12.\ 0,03 = 0{,}36''$$

Our beam is therefore not nearly stiff enough, and we must make it thicker; or else if we wish to save material, we will make it thinner, but deeper; and then brace it sideways, see Formula (31).

Example IV.

Five Concentrated Loads. *A spruce girder A B of 18-foot span carries five loads, as shown in Figure 155. What size should the girder be?*

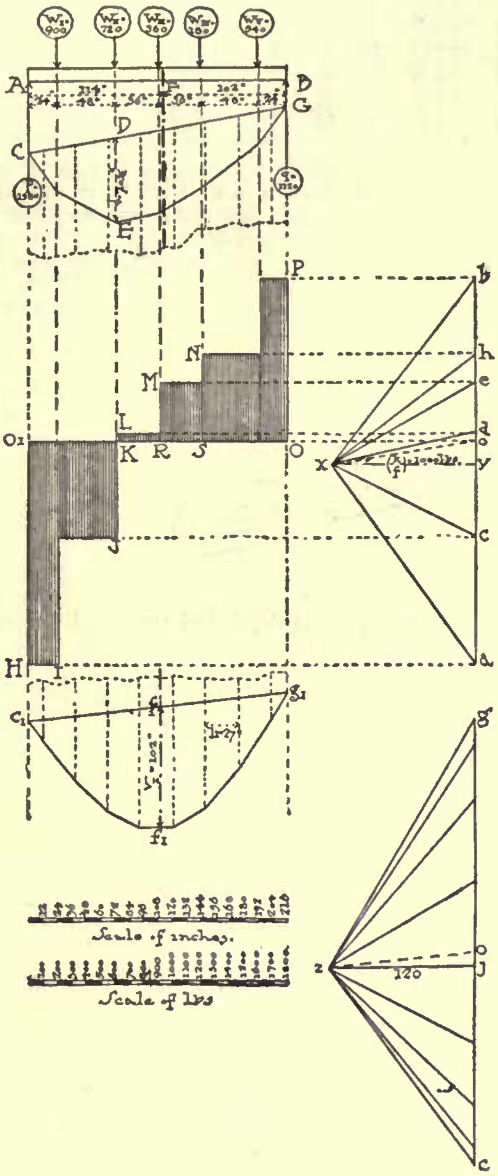


Fig. 155.

We draw $A\,B = 216''$ (inch scale); further

$b\,a = 2700$ pounds (sum of loads at pounds scale); make
$b\,h = w_v = 540$ pounds,
$h\,e = w_{iv} = 180$ pounds,
$e\,d = w_{iii} = 360$ pounds,
$d\,c = w_{ii} = 720$ pounds, and
$c\,a = w_i = 900$ pounds.

Select x distant $x\,y = 1000$ pounds from $b\,a$, (as $1000 = \left(\frac{k}{f}\right)$ for spruce, see Table IV). Draw $x\,b$, $x\,h$, $x\,e$, etc., and figure $C\,D\,G$. Draw $x\,o$ parallel $C\,G$; it divides load line as follows:

$a\,o = 1580$ pounds or reaction at A.
$o\,b = 1120$ pounds or reaction at B.

We find longest vertical through $C\,D\,G$, is at load w_{ii}, therefore greatest bending-moment on beam at w_{ii}; now $D\,E$ scales $70\frac{1}{2}''$, therefore Formula (93):

$$m_{w_{ii}} = 70\tfrac{1}{2}.\ 1000 = 70500$$

and Formula (92)

$$r = 70,5$$

From Table I, Section No. 2,

$$r = \frac{b.d^2}{6} = 70,5 \text{ and if } b = 5, \text{ we have}$$

$$5.\,d^2 = 6.\ 70,5 \text{ or}$$
$$d^2 = 84,6, \text{ and}$$
$$d = \sqrt{84,6} = 9{,}2'' \text{ or say } 10'' \text{ which is the nearest size}$$

larger than 9,2″, and of course wooden beams are never ordered to fractions of inches.

Had we worked arithmetically we should have had practically the same results.

From Formulæ (16) and (17) we should have had:

reaction at $A = 1580$ pounds,
reaction at $B = 1120$ pounds.

From rule for finding greatest bending-moment we should have located it at w_{ii} and then had Formula (23)

$$m_{w_{ii}} = 1580.\ 72 - 48.900 = 70560$$

and from Formula (18)

$$r = \frac{70560}{1000} = 70,56.$$

We now draw the shearing diagram $O_1\,H\,I\,J\,K\,L\,M\,N\,P\,O$ and find as follows:

Cross-shearing A to $w_i = H\,O = 1580$ pounds.
Cross-shearing w_i to $w_{ii} = J\,K = 680$ pounds.
Cross-shearing w_{ii} to $w_{iii} = K\,L = 40$ pounds.
Cross-shearing w_{iii} to $w_{iv} = M\,R = 400$ pounds.
Cross-shearing w_{iv} to $w_v = N\,S = 580$ pounds.
Cross-shearing w_v to $B = P\,O = 1120$ pounds.

We need not bother with it, therefore. For deflection we now divide $C\,G$ again into eight equal parts, (or $l_1 = \frac{216}{8} = 27''$) beginning with half parts at C and G. We now make lower load lines $g\,c =$ the sum of the eight verticals, putting the right vertical at the top from g down. We select pole z at a distance $z\,j = 120''$ from $g\,c$ and draw $z\,g$, $z\,c$, etc. We construct figure $g_1 f_1 c_1$ and draw $z\,o$ parallel to $c_1\,g_1$. We now divide $c_1\,g_1$ at f_1 so that

$g_1 f : f c_1 = c\,o : o\,g$, carrying $f f_1$ up to beam, we have the point F, distant 102″ from B, and 114″ from A, which is the point of greatest deflection. We find that $f f_1$ scales 102″, remembering that $e = 850000$ for spruce (Table IV), and that $i = \frac{5.10^3}{12} = 417$ (See Table I, Section No. 2) we have, Formula (95).

$$\delta = \frac{102.\ 27.120.\ 1000}{850000.417} = 0{,}93''$$

This would be too much for plastering, for if the girder supported plastering, the deflection should not exceed Formula (28)

$$\delta = 18.\ 0,03 = 0{,}54''$$

We must therefore deepen the beam very materially.

We use Formula (31),

$$x = \frac{1}{b.d^3}$$

In our case it would be

$$x = \frac{1}{5.10^3} = \frac{1}{5000} = 0{,}0002$$

Supposing we were to make the beam 4″ x 12″, then we should have

$$x = \frac{1}{4.12^3} = 0,000144$$

The deflection of the latter, then, would be

$$\delta : 0,93 = 0,000144 : 0,0002 \text{ or}$$

$$\delta = \frac{0,93.\ 0,000144}{0,0002} = 0{,}67'' \text{ still too much deflection.}$$

Were we to make the beam 3″ x 14″, we should have:

$$x = \frac{1}{3.14^3} = 0{,}0001215$$

The corresponding deflection for this beam would be:

$$\delta : 0,93 = 0{,}0001215 : 0{,}0002 \text{ or}$$

$$\delta = \frac{0,93.\ 0,0001215}{0,0002} = 0{,}565''$$

or just about what would be required in the way of stiffness.

Had we used Formula (95) we should have had, remembering that now

$$i = \frac{3.14^3}{12} = 686$$

$$\delta = \frac{102.\ 27.\ 120.\ 1000}{850000.\ 686} = 0{,}568''$$

showing that we have made no mistake in applying Formula (31). If we have any doubts as to whether a 3″ x 14″ stick is as strong as a 5″ x 10″ we use Formula (30) and have for the former

$$x = 3.\ 14^2 = 588$$

while for the latter

$x = 5.\ 10^2 = 500$, so that the 3″ x 14″ stick is actually much stronger, as well as much stiffer than the 5″ x 10″. It is, however, a very thin beam, and would be apt to warp or twist, unless braced sideways about every five feet of its length.

To attempt to get the deflection of the girder arithmetically would be a very tedious operation. It could be done, however, by inserting in Formula (41) the different values for n and m, remembering every time to make n the distance from each weight to the *nearer* support to respective weight, and m the distance from same weight to the further support.

LOUIS DECOPPET BERG.

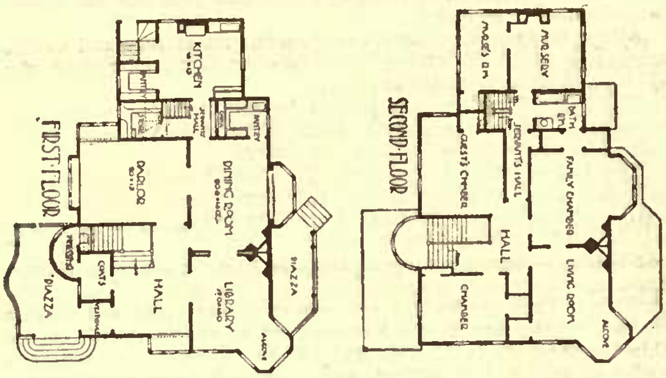
[To be continued.]

THE ILLUSTRATIONS

[Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.]

HOUSE FOR GORHAM THURBER, ESQ., PROVIDENCE, R. I. MR. E. I. NICKERSON, ARCHITECT, PROVIDENCE, R. I.

[Gelatine print, issued only with the Imperial Edition.]



DESIGN FOR CLUB-HOUSE OF THE NEW YORK ATHLETIC CLUB, SEDGEMERE, L. I. MR. GEORGE MARTIN HUSS, ARCHITECT, NEW YORK, N. Y.

FIRST METHODIST EPISCOPAL CHURCH, WILKES-BARRE, PA. MR. BRUCE PRICE, ARCHITECT, NEW YORK, N. Y.

STATE NORMAL SCHOOL, MOORHEAD, WIS. MR. J. WALTER STEVENS, ARCHITECT, MINNEAPOLIS, MINN.

MELROSE HALL, OAK LANE, PA. MR. HARRISON ALLBRIGHT, ARCHITECT, PHILADELPHIA, PA.

"SHINGLE-NOOK": HOUSE FOR BRANDER MATTHEWS, ESQ., NARRAGANSETT PIER, R. I. MR. G. A. FREEMAN, JR., ARCHITECT, NEW YORK, N. Y.

UNITED STATES GOVERNMENT BUILDING PRACTICE.[1]—XI.

CARPENTER WORK.

Arabian Tomb after L'Architecture.

UNDER this trade is generally included the entire construction of frame houses, the floor-joists, stud-partitions, roof-trusses, framing, etc., of stone and brick buildings, wood fences, shingles and roof trimmings when made of wood. Dressed flooring, construction of stairs, glazed screens, counters, wainscotting, doors and windows, are specified under the head of joiner-work.

Marine-hospital wards, quarantine stations and such other temporary buildings which are required by the Government and expected to last only a few years, are built of wood, that is, frame buildings; all other buildings, custom-houses, court-houses and post-offices, are built of stone or brick, and the construction of floors and roof made of iron or wood, frequently a combination of the two materials.

It is generally the custom to make the first floor of iron even when the other floors and roof are wood, except when the appropriation is very small for the size of the building, in which case the first floor is made of wood. A great many of the cheaper grade of buildings are of this character. Sometimes the floor immediately over the boiler-room for the heating apparatus is constructed of iron and the remainder of the first floor of wood.

The kind of lumber is that generally used for framing in the vicinity where the building is erected, hard yellow pine being the most used. Georgia and Florida pine is considered of a high quality and is generally preferred; pine from Maine, Michigan and Arkansas is also much used, white oak in some localities, and fir and redwood on the Pacific Slope.

SPECIFICATION.

All the lumber to be best quality pine or other approved suitable wood, thoroughly seasoned, straight-grained, free from sap, shakes and large or loose knots and to be square-edged, true and out of wind. All floor and ceiling joists, headers, trimmers, etc., to be of dimensions and located as shown and noted on the drawings.

[1] Continued from page 212, No. 645.

TABLE FOR SIZES OF WOOD FLOOR JOISTS.

Length. ft.	Size. in.	Space. in.	Load 125 lbs., per □'. lbs.	Capacity Factor 10. lbs.
10	2 x 10	16	1666	2222
11	2 x 10	16	1832	2020
12	2 x 10	16	2000	1852
12	2 x 12	16	2000	2666
13	2 x 12	16	2166	2461
14	2 x 12	16	2333	2285
14	3 x 12	16	2333	3428
15	3 x 12	16	2500	3200
16	3 x 12	16	2666	3000
17	3 x 12	16	2832	2823
18	3 x 12	12	2250	2666
18	3 x 14	16	3000	3630
19	3 x 12	12	2375	2526
19	3 x 14	16	3166	3438
20	3 x 12	12	2500	2400
20	3 x 14	16	3333	3264
21	3 x 14	12	2625	3110
22	3 x 14	12	2750	2970
23	3 x 14	12	2875	2840

The ends of joists to have 6″ bearings, cut to splay 3″ in their depths and to be cross-bridged in rows 5′ 0″ apart with 1½″ x 3″ stuff nailed with two nails at each end, and about every fifth joist of upper floors to be anchored to the walls with ¼″ x 2″ wrought-iron anchors turned up and forked as per sketch (Figure 41), and the joists on interior walls on line of anchored joists to be properly tied with ¼″ x 2″ iron straps, forming a continuous tie across the building. The joists to be cut to a camber of ¾″ in every 12′ 0″ of span and to be sized to a uniform depth and crown. Levelling up of joists to be made under their entire bearing with stone, slate or bricks; no wood blocks will be allowed.

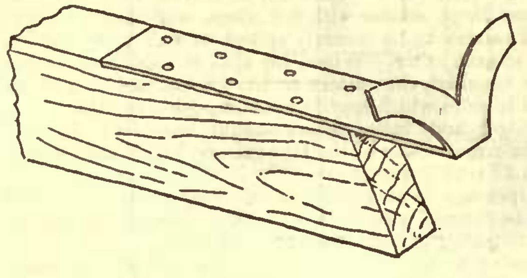


Fig. 41.

All framing to be as shown and executed in the best and most workmanlike manner, with all necessary bolts, plates, rods, angle-irons, stirrups, etc., securely nailed and bolted to joists and trimmers. All tail-beams bearing on trimmers to be framed with tenons, as shown by sketch (Figure 42), and the built headers to be well spiked together and bolted if more than two joists are used. All headers to be hung in wrought-iron stirrups ⅜″ x 2″ and bolted where necessary with ¾″ diameter bolts. No timber to be framed closer than 1″ to chimney or hot-air flue.

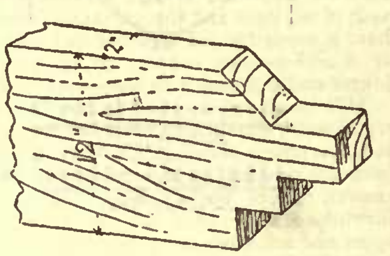


Fig 42.

Where drawings do not show the sizes of framing timbers, the joists to be framed with double trimmers and trimmer-headers at stairs, chimneys, etc. Double joists to be placed under all stud-partitions and to be well spiked together.

For carrying terra-cotta plates on which floor-tiling is to be laid, 1″ x 2″ cleats to be nailed to each side of joists.

All floor-joists (except for floors where marble tiling is to be laid) and ceiling-joists to be covered with square-edged boards 1″ thick and not over 8″ wide, dressed one side to a uniform thickness, to be close jointed and nailed at each bearing at right angles to joists with two nails; on top of this rough or under flooring best quality tarred building-paper is to be laid, well tacked down, on which is to be laid the dressed, tongued-and-grooved flooring.

The stud-partitions, where shown on drawings and where required, to be constructed with 2″ x 4″ studs (sometimes 3″ x 6″) set with narrow edge in face of partition, spaced 16″ from centres, to have a capping and sill where not resting on or located parallel with floor-joists, of same size as studs, and to have one row of diagonal bridging 5′ 0″ above floor. All openings to be double studded and trussed, and all studding, sill, cap and bridging to be securely nailed together.

All ceilings to be cross-furred with 1″ x 2″ stuff spaced 12″ on centres securely nailed, forming a plain level ceiling.

Furring against exterior walls to prevent dampness when made of wood (this is seldom done and should be avoided if possible), to be 2″ x 2″ stuff spaced 12″ to 16″ on centres, securely spiked into joints of the brickwork or to wood pieces built in the brickwork for the purpose.

Furring for cornices, architraves, arches, etc., to be generally 2″ x 2″ lumber, spaced 12″ to 16″ on centres securely spiked to supports, the profiles to be closely followed, allowing ¾″ for lath and plaster.

Roof. — The roof generally, including trusses, wall-plates, purlins, rafters, hips, valleys, ridges, collars, ceiling-beams, framing around chimneys, scuttles, dormers, etc., with the necessary stone or cast-iron bearing-plates, iron anchors, tie and tension rods, straps, stirrups, bolts, etc., to be framed of the dimensions shown, closely cut and fitted and substantially nailed, spiked and secured in place.

Trusses. — The trusses to have bearing-plates of stone or iron or to rest on the wall-plates, so as to distribute the weight properly on the brickwork; the feet of trusses to be anchored to walls by iron rods ⅞" diameter 3' 0" long, built in walls, with gib-plates 8" x 4" x ½" on ends. For wood-trusses the rafters, struts and lower chord on boom are made of wood; all tie and tension rods, king-rods, etc., are made of wrought-iron; all connections to be with mortises and tenons securely pinned or may be made with iron shoes or straps at feet, iron saddle for king-rod at apex, angle-irons, fish-plates, etc., all securely bolted with the necessary wood blocking. All tension-rods to have sleeve-nuts for tightening.

Purlins. — The purlins for carrying the jack-rafters should rest on top of the principal or truss rafters and secured thereto with angle-irons, straps and bolts. Where necessary for the jack-rafters to be on the same plane with the principals, the purlins may be hung from the principals by wrought-iron straps.

Wall-Plates. — The wall-plates on which the jack-rafters are to rest are generally made 3" x 8" or 2" x 12", halved at joints and corners, well spiked and anchored every 6' 0" with ⅞" rods about 3' 0" long with gib-plate (or 6" bent end) at bottom built in brickwork, and to have large washer with nut above wall-plate; the hip, valley and jack rafters to be securely spiked to wall plate, purlins and ridges and to each other. Where the span is small and no special trusses are required, the rafters to have collar-ties 2" x 6" to 2" x 10" spiked to sides which may form ceiling-joists to attic.

The hips, ridges and valley-rafters should have from 1½ to 2 times the area in cross section of the jack-rafters, which vary in size from 2" x 8" to 3" x 12", spaced generally 2' 0" on centres.

Dormers. — Openings to be left for dormers where required and the dormers to be framed with 2" x 4" scantling and 2" x 4" or 2" x 6" rafters, the spacing of both to be 16" on centres.

The roof framing to be doubled at chimneys and kept 2" away from the same. Properly-shaped wood blocks to be nailed to hips and ridges for securing the ornamental metalwork to.

Boarding. — The entire roof and the roofs and sides of dormers, cupolas, towers, etc., to be covered with square-edged, rough boarding 1" thick and not over 8" wide, close-jointed and nailed to each bearing, and all the boarding to be covered with a layer of fibre or resin-sized building-paper well lapped and tacked down.

Skylights, scuttles and ventilators generally to be constructed of 1½" or 2" lumber, substantially secured to roof framing, to have a curb not less than 4" high and made ready to receive the glazed sash of skylight and the galvanized-iron ventilator. The scuttle to have a cover framed together and covered with IXX charcoal tin or fourteen-ounce copper, to be hung with strong wrought-iron hinges and fastened with hasp-staple and padlock with chain.

Mill Construction, which is now frequently met with in this country in mills, warehouses, office-buildings, etc., has never been adopted in Government buildings for floors, but in a few instances roofs have been constructed on this principle, which consists in framing the trusses, rafters, purlins, hips, ridges, etc., in the same manner as heretofore mentioned, but the timbers are placed much farther apart and are made correspondingly large in order to bear the heavier loads of greater surfaces, the theory being to make all the timbers large so that in case of fire they will be much longer in burning than if small timbers were used and thus allow a longer time for putting out the fire. When mill construction is used, the roof-boarding is generally made 2" and sometimes 3" thick.

Flag-pole. — Trimmers for seat for flag-pole to be framed in attic-floor where shown, to be blocked apart and strongly nailed, the foot of pole to rest in cast-iron shoe ⅞" metal which must be substantially bolted to trimmers, the collar at roof-line to be wrought-iron ½" x 3" of the required length and fastened to rafters.

The flag-pole to be pine or spruce, straight-grained, and free from knots, sap and shakes; 8" diameter at the butt, 4" at top and 25' 0" high above the roof. The top to be banded with a wrought-iron collar, and to have a 10" diameter copper-ball gilded with XXX gold-leaf mounted on a wrought-iron rod. The pole to be furnished with two lignum vitæ sheaves and two galvanized iron halyard cleats. Two sets of best hemp halyards to be rove before raising. The pole to have two coats of linseed oil and one coat of spar varnish.

Balloon-framing. — Balloon-framing consists of a sill on top of which the studs are set and secured, the capping or plate on top of studs, the ribbon or timber for carrying the intermediate floors, the bracing at angles and framing of openings.

The sill where resting on a wall or underpinning to be made 4" x 6" or 4" x 8", to be halved at connections and corners, and securely spiked; where not resting on a continuous wall, but on piers, it must be made larger and calculated in same manner as girders.

The studs to be 3" x 4" or 3" x 6", with a post of double the size at corners, to be doubled at all openings and firmly nailed to sills and to plates, each angle to be thoroughly braced on both sides at top to plate and at bottom to sill, with braces of same size as studs; the studs to be in one piece up to plate carrying the rafters, to be spaced 16" on centres and to be trussed over openings where necessary, and to have one row of diagonal bracing 5' 0" above floor.

The plate generally to be the same size as the studs, securely spiked on top of studs and halved at connections and corners, and well spiked.

The ribbon for carrying intermediate floors to be 1½" or 2" x 6," let into studs with about ½" projection and securely spiked.

The framing of floors, rafters, etc., to be as heretofore described, except that the floor-joists wherever coming against studs to be securely nailed thereto and toe-nailed to sill, ribbon or plate where not coming against studs; the rafters to be spiked to plate.

The entire sides of studding to be covered with 1" thick boards not over 8" wide, nailed to each stud diagonally laid, this to be covered with tarred or resin-sized building paper, and over this the dressed lapped-siding to be nailed.

All the trimmings, cornices, eave-boards, gutters, door and window trimmings to be of white-pine worked to sizes, mouldings, etc., shown and securely nailed in place.

The ends of rafters may project beyond eaves to support the cornices, or where necessary lookouts to be nailed to plate and to rafters for carrying the cornices and gutters.

The lapped-siding is generally ⅞" thick, dressed, moulded and rabbeted, about 4" wide, nailed on horizontally, and butting squarely against all casings or trimmings of openings and against angle boards, which should be from 4" to 6" wide.

Shingles. — Shingles are generally used to cover the roofs of frame buildings where cost is essential, as they are usually cheaper than good tin. They are made of pine sawed, also of cedar and chestnut shaved, but the best in the Eastern markets are the shaved cypress shingles about 6" to 7" wide and 18" to 24" long; they should be nailed at waist with two shingle nails showing 4" to 6" to the weather, and be closely cut at hips and valleys, and have double courses at eaves and ridges. Red-wood shingles are used almost entirely on the Pacific coast, they are also being used in the East.

Fences. — Wood fences are frequently constructed on the rear and sides of lots around Government buildings. The posts to be locust or cedar 6" to 8" in diameter, generally dressed above ground and from 3' to 4' 0" in the ground, the portion in ground to be tarred, they are to be spaced from 8' to 10' apart. The rails to be 3" x 4" dressed hard pine, let into posts 2" and securely spiked: frequently the top rail is laid flatwise on top of post and spiked thereto, and the post bevelled off back of the rail.

When the fence is made of close boards, the boarding to be ⅞" thick, 3" to 3½" wide, dressed, matched and b aded, set perpendicularly and nailed with two nails to each rail, to have a base board at bottom 10" to 12" high, nailed to posts and a grooved cap to be let over the boarding and nailed to same.

Where pickets are used they are to be hard pine or oak ⅞" thick, 3" wide and set 3" apart, securely nailed to each rail.

The entire wood fence to be painted three coats of lead and oil paint on both sides; the finishing tint to be approved.

MEASUREMENT.

All wood-framing work, floor-joists, studding, sills, wall-plates, roof-truss timbers and rafters are measured by the foot board measure [board measure = 1 square foot 1" thick]; in taking the lengths for such timber they should be taken to an even number of feet (*i. e.*, 12', 14', 16' and so on), because unless specially ordered all framing lumber is sawed and kept in stock in even foot-lengths, and when a piece of timber is of an odd length the next above even foot must be taken to get the piece out and hence the waste.

Rough-boarding for siding, under flooring, roof-boarding, etc., is measured net per foot board measure, and builders generally allow ⅙ for wastage.

Dressed or l pped-siding is measured per square foot, specified thickness, and ¼ is generally allowed for wastage.

White-pine trimmings, cornices, mouldings, etc., are generally estimated by the piece or lineal foot of moulding.

Shingles are generally estimated by the thousand, sometimes per square. Fences are estimated per lineal foot, giving description, and flag-poles, per piece.

The allowance for wastage is generally followed by builders, but the practice of the office is to measure net quantities and allow in price for the wastage.

COST.

The cost of carpenter-work is dependent on the price of lumber in the locality where required, the market prices differing greatly in most cities, Chicago being considered the cheapest market for framing lumber, especially that grown in the lake regions. Redwood, which is so plentiful on the Pacific slope that it is often used for framing, boarding, etc., is so costly in the Eastern States that it is seldom used, and then principally for interior finishing wood and shingles; the cost, of course, being occasioned by the transportation for such a great distance.

Pine floor-joists, with the rough boarding over same, will average about 3' 6" board measure per square foot of floor area, and cost about 2c. to 3c. per foot board measure put in place, or 7c. to 10c. per square foot of floor area.

Stud partitions, 3" x 4" x 16" on centres, will average 1' board measure to 1 square foot of wall, and cost, put in place, about same as floor-joists, 2c. to 3c. per foot.

Roof-framing, trusses, boarding, etc., will average from 4' to 6' board measure per square foot of roof-surface, and cost about 4c. to

6c. per foot board measure, or 15c. to 30c. per square foot of roof-surface dependent on framing and trusses.

1882, Albany Southern pine floor-joists, 4½c. a foot board measure, put in place.

1882, Paducah, Ky., oak floor-joists, $1\frac{6}{10}$c. per foot board measure, furnished.

1886, Baltimore rough pine lumber, $13 per thousand feet.

Lapped-siding costs from 5c. to 7c. per square foot, put in place, and trimmings, mouldings, etc., may be estimated at about 12c to 15c. per square foot, put in place.

Shingles vary so in cost that the weekly price-list for nearest market had best be referred to for prices of them furnished; the labor of nailing them on is worth from $1 to $1.50 per square, or about $2 to $2.50 per thousand.

The ordinary close board fence and picket fence, including posts, etc., complete, are worth from 60c. to $1 per lineal foot put up complete.

It may be well to say that in estimating all carpenter-work, the market prices of the materials in the locality should be obtained; the question of cost of labor of putting said materials in place should then be carefully considered as to wages of mechanics and the hours worked per day, and can only be accurately estimated after long experience and using good judgment. The foregoing prices are only given as approximate guides. JAS. E. BLACKWELL.

EARLY SETTLER MEMORIALS.[1]—XIII.

MEMORIALS TO JOHN PAULDING, DAVID WILLIAMS AND ISAAC VAN WART.

Monument to the Brothers Cairoli, Rome, Italy. Ercole Rosa, Sculptor.

NO incident in the war of the Revolution awakened so deep an interest at the time of the occurrence, or has become so important a part of American history, as the capture of Major André. "The happiness and progress of mankind have as often been advanced or retarded by small events as by great battles. Three hundred men, led by Leonidas, stemmed the Persian torrent at Thermopylæ; in 1780 three farmers preserved the liberties of the American people.

The month of September of that year was a gloomy and anxious time for Washington and Congress. Charleston had fallen, Gates had been disastrously defeated, and the whole South had come under British control. New Jersey was overrun, and twenty thousand of the enemy's veterans were gathered in New York City. The French fleet had sailed away, a large reinforcement to the British navy had arrived, and Washington's cherished plan of attacking the city had to be abandoned. The only American force worthy the name of an army, numbering less than twelve thousand men, suffering from long arrears of pay, without money to send their starving families, and short of every kind of supplies, was encamped at and about West Point. The capture of this post, controlling the passes of the Hudson, with its war materials, vital to the maintenance of the patriot army, and its garrison of four thousand troops, including the person of Washington, would end the war, in the judgment of many British generals and statesmen.

[1] Continued from No. 610, page 107.

"Fortify from Canada to the city of New York," said they, "and we can hold the colonies together." "Capture and place a chain of posts along the route from New York City to Canada, and we can crush rebellious New England, and awe all the rest into submission," said the British Cabinet.

The battle of Saratoga and surrender of Burgoyne, defeated the last and most formidable attempt to accomplish this result by arms.

It was now sought to be accomplished by treason.

During the eighteen months, previous to this memorable September, Benedict Arnold, the General-Commandant of West Point, had been carrying on a correspondence, over the signature of Gustavus, with Major John André, who replied as John Anderson, Adjutant-General of the British forces, and who acted for Sir Henry Clinton. This correspondence, written in the vocabulary of trade, and treating of the barter and sale of cattle and goods, was really the haggling about the price and betrayal of the post of West Point, the liberties of the American people and the destiny of a human soul. Arnold well understood the conditions surrounding the American army and the importance of West Point, to either party. Deprived of his command in the army, a bankrupt, as the result of excesses, smarting under the reprimand of Congress, although retaining the confidence of Washington, he secured the command of West Point for the purpose of selling it to the British. The time had come for action, and the British must be satisfied as to the identity of their man and the firmness of his purpose, and commit him beyond the possibility of retreat. For, said Sir Henry Clinton, "We propose to risk no lives upon the possibility of deceit or failure."

The first meeting, appointed at Dobbs Ferry, between Arnold and André, on the 12th of September, failed, and the former came near being captured. With the audacity of a fiend, he reported his visit at once to Washington, and the next day wrote a letter to General Greene, expressing bitter indignation against Gates for his Southern defeat, and the apprehension that it would leave an indelible stain upon his reputation.

Soon after, he met Washington, on his way to see Rochambeau at Hartford, carried him across the river at Verplank's Point, in his barge, and there asked his chief's permission to attend, ostensibly, to a matter concerning some confiscated lands, but really to arrange for an interview with André; but Washington refused his permission, saying the matter had better be left with the civil authorities. Arnold, however, lurked in the bushes of the Long Cove below Haverstraw, sent a boat at midnight to the "*Vulture*," a British gunboat having André on board, to bring the latter to the shore. André, disguised in a cloak, and cautioned by Sir Henry Clinton not to go within the American lines, not to be the bearer of any papers, nor even to disguise himself, returned with the boatmen and remained with Arnold until daylight, arranging the terms of the surrender, when they repaired to the house of J. H. Smith, where the bargain was completed September 22, 1780; André receiving the plans of the fortifications, armament and troops at West Point, and the proceedings of Washington's last Council of War. He also receives the assurance that the defences of the fort shall fall without a blow, and assures Arnold, in return, of a Brigadier-Generalship in the British army and seven thousand pounds in money. Arnold returns to the fort, and André, further disguised and armed with a pass from Arnold in the name of John Anderson, crosses the river to Verplanck's Point, in company with Smith, as a guide, passes through Livingston's camp in safety and hurries on to New York.

Colonel Livingston, who commanded at Verplanck's, did not like the appearance or presence of the "*Vulture*" in that locality, and had applied to Arnold, a few days before the meeting of the conspirators, for a heavy gun to fire upon her, but being refused, he used a little four-pounder, and with such effect that she was obliged to drop down the river fifteen miles. Smith, André's guide, did not dare to attempt to reach the vessel by boat, and so the land journey was determined upon. At Crumpond, Captain Boyd, an inquisitive Yankee, stopped the travellers, and though Arnold's pass surprised him, he persuaded them to remain over night. At early dawn they departed, with Captain Boyd's advice to look out for the cowboys. At Pine's Bridge, Smith's courage failed, and he bade his companion good-by. Smith returned to West Point, reported André's safety to Arnold, continued on to Fishkill, and supped that night with Washington and his staff. André, fearing nothing from the cow-boys and being in the neighborhood of his friends, the loyalist families, struck for the river road.

On the morning of the same day, September 23, seven of the young farmers of the vicinity of Tarrytown, some of whom had served in the Continental army, heard that a number of horses had been stolen, and they formed themselves into a scouting party to intercept the thieves if they should attempt to pass with their booty to New York. Three of the party, John Paulding, about twenty years of age, Isaac Van Wart, of the same age, and David Williams, five years older, stationed themselves on the post-road at a small brook, hidden by some bushes, just above Tarrytown. Paulding was dressed in a British uniform, a yager coat, green laced with red, which had been given him by a friend in New York, after he had escaped from the British prison, four days before. They seated themselves in the bushes, and were playing cards, when they heard the footsteps of a galloping horse. On approaching the road, they saw a gentleman riding towards them. It was André. As he neared them, they cocked their muskets, aimed at him, and he checked his horse. He

was the first to speak, and said, "My lads, I hope you belong to our party." Paulding asked, "What party?" And André answered, "The lower party." To which Paulding said, "We do." André then told them that he was a British officer, who had been up in the country on particular business, and did not wish to be detained a single moment. He then showed them his gold watch as an evidence that he was a gentleman. Paulding then told him that they were Americans.

Somewhat disconcerted, André exclaimed, "God bless my soul! a man must do anything to get along, I am a Continental officer, going down to Dobbs Ferry to get information from below."

He then presented a pass from General Arnold, in which was the name of John Anderson. Seizing hold of the bridle of the horse, they ordered him to dismount, took him down ten or twenty rods from the road, beside a run of water and near a large tree, and Williams proceeded to search his hat, coat, vest, shirt and breeches, in which they found eighty dollars in Continental money; and at last ordered him to take off his boots. As Paulding drew off André's stocking, he excitedly cried out, "My God! here it is!" On examination they found three half-sheets of written paper, enveloped by a half-sheet marked "Contents, West Point." Paulding again exclaimed, with much excitement, "My God! he's a spy!" On pulling off the other stocking a similar package was found.

They now allowed him to dress and marched him across the road into a field about twenty rods, where they asked him from whom he got the papers. He replied, "Of a man at Pine's Bridge, a stranger to me." He then offered them his horse, equipage, watch and one hundred guineas, if they would give him his liberty. This they refused, unless he would tell them where he got the papers. He refused to tell, but raised the sum of money to one thousand guineas and as many dry goods as they wished, adding that they might keep him until the goods were delivered to them. They still refused. He again offered them ten thousand guineas and all the dry goods they desired. To which Paulding answered, "No! by God, you shall not stir a step; we are Americans and above corruption, and go with us you must."

They then took him to the nearest military station, twelve miles distant at North Castle, and delivered him to Colonel Jaimesen, the commanding officer.

On October 7 Washington sent to Congress a copy of the proceedings of the trial of André, with the names of his captors, and on its receipt, that body passed November 3, the following resolution:

"*Whereas*, Congress have received information that John Paulding, David Williams and Isaac Van Wart, three young volunteer militiamen of the State of New York, did, on the 23d day of September last, intercept Major André, Adjutant-General of the British army, on his return from the American lines, in the character of a spy; and, notwithstanding the large bribes offered them for his release, nobly disdaining to sacrifice their country for the sake of gold, secured and conveyed him to the commanding officer of the district, whereby the dangerous and traitorous conspiracy of Benedict Arnold was brought to light, the insidious designs of the enemy baffled and the United States rescued from impending danger,

"*Resolved*, That Congress have a high sense of the virtuous and patriotic conduct of the said John Paulding, David Williams and Isaac Van Wart.

"*In testimony whereof:* ORDERED, That each of them receive annually, out of the Public Treasury, Two Hundred Dollars in specie, or an equivalent in current money of these States, during life, and that the Board of War procure for each of them a silver medal, on one side of which shall be a shield with this inscription: 'Fidelity,' and the other the following motto, '*Vincit Amor Patriæ*,' and forward them to the Commander-in-Chief, who is requested to present the same, with a copy of this resolution and the thanks of Congress for their fidelity, and the eminent service they have rendered their country."

Shortly after Washington gave a grand dinner-party at Verplanck's Point. There were present, his staff, the famous generals of the army, and, as honored guests, the three captors, to whom, in an impressive speech, Washington presented the medals. Williams's medal is now in the State Library at Albany. Congress also gave them the sum of twelve hundred and fifty dollars, or the same value in confiscated lands in Westchester County. And the Legislature of the State of New York gave to each of them a farm in consideration of "their virtue in refusing a large sum, offered to them by Major André, as a bribe to permit him to escape."

Thus promptly and generously did the Continental and State Governments recognize and reward the deed of these men. But the feeling existing in the locality where they lived, at the time of the capture, was quite a different matter. "It is hard to understand now the condition of this region at that period. It was ominously known as neutral ground, marauded and harried by royal and Continental soldiers, and by Skinners and Cow-boys, robbers and brigands of equal infamy. The Whig farmer saw his cattle driven off and the flames of his buildings lighting the sky to-night, and mercilessly retaliated upon his Tory neighbor to-morrow. Fences were down, fruit rotted ungathered on the ground, rank vegetation covered the unsown fields, and the gaunt and vengeful citizen guarded, with ready musket, his family and hidden stores, or watched in ambuscade by the way-side, to recapture his stolen property or prevent the delivery of foraged stores to the enemy. Amidst such experiences and surroundings the captors of André passed their daily lives." The operative sentiment in Westchester County was Tory. It passively, and sometimes actively held in contempt those who were trying to rob them of one form of Government without being able, apparently, to provide another. The patriots of this vicinity when not protected in free speech and action by the presence of Continental troops, were cautious and guarded.

"When André was executed, the expression of Tory sentiment was one of execration, and even among the patriots it was thought that the sentence was unjust and that the execution was a mistake. So deeply was this feeling known to exist that the captors were never known to allude to it in other than an evasive way. They fell into the general current of opinion and had a secret misgiving that they were, in some degree, responsible for 'the vengeance meted out to André.' For years sympathy for poor André was the predominant sentiment. Had there been a proposition made at any time within the fifty years subsequent to the capture to erect a statue on the spot, it would have met with almost universal disapproval from the patriots themselves."

So writes a prominent citizen of Tarrytown; the captors were ignorant men, Paulding being the only one who could read. There are many who believe to this day that they were of that disreputable crew called "skinners," and that they were actuated by motives far different from those of unselfishly serving the patriotic cause. That André fell into their hands and was thereby prevented from consummating the bargain with Arnold was well; the rest was purely providential, but let the means by which Providence worked be forgotten is their idea. The horse and its equipments and André's watch were sold by the captors and the money divided between them and four other persons who belonged to their party and were at another point when the capture took place. The watch was bought by Col. W. S. Smith for thirty guineas at the time of André's court-martial, which took place at Tappan.

Of Van Wart little is known. He lived a highly-respected life for forty-nine years after the capture. David Williams served four years in the Revolutionary army previous to the event, and died fifty-two years after, deeply mourned for his many excellent qualities. Paulding served in several different commands before the capture, and died forty years after.

The French Lieutenant-colonel Fleury, writing from Newport in October, 1780, to his friend Peters, closes his letter, after expressing his horror at Arnold's conduct, with these words: "How great are, compared to Arnold, those *peasans* who refused the bribe from André. Let this be remembered in favor of the poor."

In 1817, a bill was introduced in the Congress of the United States asking for an appropriation of twenty thousand dollars to erect a monument to Paulding, Williams and Van Wart. It passed the House, but either did not reach or was defeated in the Senate. It was opposed in the former body by Major Tallmage because, as he asserted, the captors of André were of that class of people known as "cow-boys" or "skinners" who passed between both armies, as often in one camp as another, friendly to each as their interests might prompt, and without attachment or preference to either; that he had been told by André that, in his opinion, their search of his person was for plunder and not for evidence of his character; that if he could have paid the sum demanded by them he would have been released, and that their only motive in returning him to the American camp was the hope of a large reward. Major Tallmage stated no fact in support of his own or André's opinion. Very soon after the appearance of the above remarks, sixteen inhabitants of Westchester County, all aged and respected men who had known the captors during the Revolutionary War, united in declaring in a published document, that the assertions of Major Tallmage were not only untrue in every respect, but the captors were universally esteemed as being faithful and ardent patriots. Paulding and Van Wart were then living in Westchester County, and they also made sworn affidavits denying the charges of Major Tallmage and giving again the details of the capture.

In 1826, a Paulding Monument Committee was formed in New York City, and through its efforts the corporation of the city erected in 1827, in the old graveyard in the little village of Tappan, near Peekskill, in Westchester County, a marble monument to Paulding. It bears this inscription on its face:

HERE REPOSE THE MORTAL REMAINS OF
JOHN PAULDING,
WHO DIED ON THE 18 OF FEBRUARY, 1818,
IN THE 60TH YEAR OF HIS AGE.

On the morning of the 23 of September, 1780,
Accompanied by two young farmers of the County of Westchester,
(Whose names will one day be recorded on their own deserved monuments)
He intercepted the British spy André.
Poor himself
He disdained to acquire wealth by the sacrifice of
His country.
Rejecting the temptation of great rewards,
He conveyed his prisoner to the American camp
and
By this act of noble self-denial,
The treason of Arnold was detected:
The designs of the enemy baffled;
West Point and the American army saved;
And these United States,
Now by the grace of God free and independent,
Rescued from most imminent peril.

THE CORPORATION OF THE CITY OF NEW YORK
ERECTED THIS TOMB
AS A MEMORIAL SACRED TO
PUBLIC GRATITUDE.

On one side of the pedestal is carved a fac-simile of the face of the medal voted by Congress to each of the captors. On the opposite side the reverse of the medal is carved on a shield. The monument is made of marble and is surrounded by an iron railing and a marble coping. It is thirteen feet high and seven feet square at base. It is described "as a pedestal surmounted by a cone, the whole composed of most massive materials and fastened with iron cramps in such a manner as to resist the severity of the climate for ages to come."

The monument was dedicated on the 22d of November, 1827, in the presence of "a vast concourse of people," including many Revolutionary soldiers. Hon. William Paulding, said to be a relative, the mayor of New York, delivered the dedicatory address.

It stands in the midst of many interesting historical associations. Near by is the old, red, peaked-roofed, rectangular, wooden Episcopal church where Washington frequently worshipped. The interior of this ancient pile is unchanged since Revolutionary days, and mice and spiders are the principal occupants. The old Van Rensselaer manor house, once Washington's headquarters, is also within gunshot of the monument.

T. H. Bartlett.

[To be continued.]

COMMUNICATIONS

A CORRECTION.

Boston, May 28, 1888.

To the Editors of the American Architect: —

Dear Sirs, — We are not building a *laundry* but a steamer *landing* at Belfast, Maine, for the Boston and Bangor S. S. Co., including ticket-office, waiting-rooms, etc. Will you please correct in your next issue. You may be pleased to know that the item was noticed by others than myself for we have received this morning two circulars from agent for Patent *Laundry* Systems.

Very truly yours, H. M. Stephenson.

NON-CORRODIBLE IRON.

New York, May 26, 1888.

To the Editors of the American Architect: —

Dear Sirs, — We notice your editorial mention of the hydrogen process. This process is not new and seems to produce an oxide-of-iron coating instead of a compound of hydrogen. It is fully described in United States Patents to J. P. Gill, Nos. 283,999, 284,000, 284,001. Respectfully yours, The Wells Rustless Iron Co.

SPONTANEOUS COMBUSTION OF OILED SHAVINGS.

Vineland, N. J., May 29, 1888.

To the Editors of the American Architect: —

Dear Sirs, — We notice in the *American Architect and Building News* of May 19, 1888, under the head of "Notes and Clippings," an article entitled "Spontaneous Combustion" which relates to a case which occurred at our factory, and under our own observation. We take pleasure in enclosing herewith a photograph of the burning, "taken on the spot." Since our experience as stated in the article referred to, and only recently in fact, we threw out some oiled shavings on the ground, at a safe distance from our buildings, and, after having been wet by two or three rain-storms, they burst into flame a few days ago, and were entirely consumed.

Very respectfully, Gage Tool Co.

NOTES AND CLIPPINGS

Artificial Incubation in Egypt. — One of the oldest industries in Egypt is artificial egg-hatching, principally engaged in by Copts. There are said to be 700 establishments of this nature in the country, and the production of chickens from the ovens is estimated at from 10,000,000 to 12,000,000 annually. The season for incubating lasts through three months of the early summer. The country people bring eggs to the proprietors of the "farroogs," and give two good eggs for every newly-hatched chick. — *Consular Report.*

Paris Fires in 1887. — The returns of the Paris (France) Fire Brigade state that the total number of calls for fires last year was 988, this being exclusive of 1,912 chimney fires. The damage done by these 988 fires is estimated at £172,000, this being exclusive of the Opéra Comique, the loss sustained by the destruction of which has not yet been accurately calculated. In 878 cases the losses were in whole or part covered by insurance. The report goes on to state that there are at the present time 3,558 water-plugs in the streets, with 25 depots for fire engines, and 211 calling stations. In the course of the past year 3 gold and 23 silver medals, in addition to 43 certificates of distinguished conduct, were awarded to men of the fire-brigade. The official statistics put the number of deaths by the burning of the Opéra Comique at 79, and of the persons taken out alive at 211: but this is very much below the reality. — *New York Evening Post.*

TRADE SURVEYS

It is probable that reductions in wages will be made in nearly all classes of labor, excepting in the building trades, before the close of the summer. In those branches controlled by schedules slight reductions are expected to be made. The railroads have reduced freight-rates on between 30,000 and 40,000 miles of road; part of these reductions have been due to rate wars. The conflict between the railroads in the Northwest continues, and there rates are lower than they have ever been. It is not probable that these troubles will extend to other sections. There is, at this time a surplus of labor in nearly all of the Western towns and cities for which there are no immediate prospects of employment. Employers have a better opportunity to rearrange rates of compensation than they have had for several years, but advantage will be taken of this temporary oversupply of labor only where competition forces such action. The general desire among manufacturers and employers of labor is to continue at present rates, but reductions have been rendered necessary by the declining tendency in prices, and by the general restriction of demand. The industries are in a healthy condition; lessened consumption has been met by a lessened production, and the financial relations between buyers and sellers have not been seriously disturbed as yet. There is a spirit of accommodation among business men which promises well for the future; there is no disposition to crowd; jobbers are willing to extend credits; manufacturers are willing to do their best with buyers; but everywhere bottom prices are insisted upon and forward requirements are covered only in exceptional cases. One striking feature of the market is that there are little or no accumulations of stocks; when the turning-point comes, it will find both producers and consumers practically bare. In former depressions this has not been the case; in every one with which the country is familiar, the first difficulty to be gotten over, when an improvement has set in, has been the consumption of accumulated goods and merchandise. The people, or rather, the manufacturers, have learned valuable lessons from the mistakes of the past, and for months have been restricting production and avoiding any accumulations. It is for this reason that the prediction is made in a good many business circles that business will begin to improve early in the fall. Probabilities point that way. A great deal of railroad-building would be pushed now but for the uncertainties existing as to price of material of all kinds, as to abundance of money, as to the balance of trade, and as to tariff duties. Several million dollars will be invested in railroads, not only in the Southwest, but the Northwest and in localities where we are now told that railroad-building has been overdone. This over-construction of railroads may exist with reference to long or trans-continental lines, but it is not true with regard to short lines in any section of the country. There is need of a good deal more railroad mileage than the country possesses, and railroad managers and investors in railway bonds and stocks are fully convinced of this fact. It is this that gives the strong tone to the railroad bond and stock market in the face of poor and unpromising earnings. Architects in a number of the leading Western cities report a sluggishness with reference to new enterprises. They say that material is cheap enough, money abundant enough, prospects favorable, and conditions healthful, and yet there is an unaccountable holding back in large building enterprises for which they are unable to offer any intelligent explanation. There is considerable activity in Chicago, but not such as the builders there have anticipated; St. Paul and Minneapolis are ahead of last year's figures; Omaha reports considerable activity; Kansas City is doing remarkably well in some lines. One good authority states that outside of Denver, Salt Lake City, Tacoma, and the cities above mentioned, there is really no genuine industrial or building activity. This may be putting the case rather too strongly, but the fact remains that just now there is a conservatism prevailing among managers of industrial enterprise and builders that is somewhat discouraging for those who indulged in high hopes at the opening of the year. There is but little room for a decline in building material; lumber is about as low as it can go; iron and steel of all kinds are selling at very little above cost. The real-estate speculative era is past and desirable lots and land are now to be purchased in many cases at fifty per cent less than twelve months ago. The development of railroads has brought a great deal of desirable territory within reach and builders and buyers are offered abundant opportunities for selection. In the wheat regions of the Northwest there is a great deal of elevator-building promised. The boat-builders along all of the lakes are doing more work than for years. The large machinery establishments are also very busy West and East. Taking the industrial situation all through, we find less activity, more conservatism, and a more careful study of future requirements. Most of the returns from railroads for the past few weeks have been of an encouraging character, but it is altogether probable that unfavorable returns are withheld. The newspapers are interested in brushing aside the dark clouds in the horizon. Wall Street traders are much better informed than the writers in newspaper offices, and from them some interesting points can be learned. The pith and substance of the latest responsible utterances is that railroad securities will improve in value within twelve months, under the better management and greater economies introduced. Foreign investors, who seldom make a mistake, are showing their confidence in American securities by liberal purchases. Gold is going abroad, but there is an abundance in the interior to stand a long drain. Our export trade is against us, but this signifies nothing for the present. The foreign demand for the farm-products of the Northwest will probably keep prices of cereals at their lower rather than their higher limits. No matter in what channel of trade soundings are taken, we find sufficient evidence to justify the confidence which is generally felt in the steadiness of prices and an expansion of demand as soon as the present depression shall have had a chance to exhaust itself. The lack of confidence so far as present transactions are concerned, is a necessity, and is having a healthful result. All speculative values are being squeezed out and the controllers of our industries and masters of transportation understand thoroughly that the present corrective agencies at work are rendering good service to them and to all legitimate enterprise. The weakness of the commercial situation in past decades has been due to the fact that there were thousands of lame traders and manufacturers. The strength of the situation for the next five or ten years will be due to the absence of that kind of competition. The associations and combinations and trusts are helping to drive this element out of the way, and in this respect they are doing good service, although possibly threatening the interests of the people in another.

S. J. Parkhill & Co., Printers, Boston.

THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. XXIII. No. 650.

Copyright, 1888, by TICKNOR & COMPANY, Boston, Mass.

JUNE 9, 1888.

Entered at the Post-Office at Boston as second-class matter.

CONTENTS

WE imagine that it will surprise most people to learn that there is a technical school in New York, exclusively for girls, which has been in existence fourteen years, and graduated this year a class of nine hundred and twenty-four members, or more than the united numbers of the graduating classes of boys in all the technical schools in the Western Hemisphere. It is true that the sciences taught in the school are not of a very abstruse character, but they are of the sort best adapted at present to help girls to earn an honest living, and many a woman must bless the thoughtful charity by which she was put in the way of independence. There is still something strange to an American in the modern movement by which women have entered into nearly all the departments of industry and trade which were once monopolized by men. It is not many years since a young girl's face was a rather rare sight on Wall or State Street, and those that were seen generally belonged to persons who were shyly hurrying by on their way to a ferry or railway station. Now nearly every broker's or lawyer's office and merchant's counting-room has its gentle, industrious book-keepers and type-writers, and in many cases these modest and faithful assistants are entrusted with very great responsibility. All the girls who wish to be employed, however, cannot find places as type-writers or book-keepers, and it is a matter of much importance to the welfare of the sex to increase the number of occupations in which it can be of service. This sort of work is just what a technical school can do, and those who would like to see the weaker class of their fellow-citizens placed in a position where they need not be dependent for support upon the uncertain mercies of their male relatives will do well to keep the New York example in mind.

AMONG the subjects taught in the school are stenography and book-keeping, mechanical and free-hand drawing, sewing, both by hand and machine, cutting and fitting, music, designing, as applied to textile fabrics, wall-papers and tiles, and modelling. All the instruction given is free, and the salaries of the twelve teachers employed, as well as rent and other expenses are paid by subscription, under the care of the Young Women's Christian Association. So far as the public is concerned, the education of women in all these, as well as other kindred subjects, is an unmixed advantage. Not only are thousands of intelligent persons changed from idle and often very poor consumers to industrious and comparatively affluent producers, but the introduction of so much trained skill into the practice of the domestic arts must before long show itself in the development of those arts. The manufacture of wall-paper in this country certainly owes to a few clever women a great part of the extraordinary artistic success which it has achieved; and, to take another example, the decorative embroidery of the Associated Artists, and of Mrs. Holmes before them, give a promise for the future of American art which is hardly to be found in the painting or sculpture of the country. If we could suggest anything which might, with advantage, be added to the curriculum of this or similar schools, it would certainly be the development of the actual practice of artistic industry in other ways besides embroidery. There is no reason, for instance, why women here should not be as successful in decorative painting as the Misses Garrett and their rivals are in England. Most women are somewhat sensitive to color, but are so persuaded of their natural gift in this direction that they scorn to learn anything about the subject, and make, in consequence, laborious attempts at decoration which, to everybody except themselves, appear painfully ignorant and bald. If the same women would get rid of the notion that Heaven has already taught them a business which their brothers spend years in learning, and would, like men, make themselves acquainted with the observations of such masters as Owen Jones, Dr. Dresser and William Morris, and study and compare the work of different ages and countries, the beautful forms of the antique and the Renaissance, the brilliancy of the Japanese, and the ineffable coloring of the Chinese, they could, more easily than most men, acquire a resource and certainty which would make them the best and most rapid of decorators. The same sort of training would fit them for other artistic professions. We cannot say that we think the system of making designs for tiles and similar things, for indifferent workmen to carry out, is calculated to develop the highest artistic capacity, or produce the most beautiful art. The highest beauty can only be added by the artist's own hands, without the intervention of mechanics, and there is just now a wide field for the use of works of decoration which shall be as much autographs of the designer as an easel picture could be. To take a single example, a great deal of mosaic for the adornment of buildings is now made in Venice by an association of girls of good family, who draw and color the designs, pick out the bits of glass or stone, and send them to be put in position. Although mosaic is now a rare luxury with us, it might be popularized in this way to the general advantage. There is a sort of mosaic, useful either for floors or walls, which is made by gluing the bits of marble or glass on brown paper. The paper is then sent in sheets to the place where it is to be used, and laid with the bits of marblo downward, on a bed of fresh Portland cement. When the cement has set hard the paper is washed off, and the mosaic finished by polishing with a stone. For the ornamentation of our vestibules and hearths very effective use might be made of this means. The broken bits of tile from the tile-layers answer an admirable purpose for mosaic, and give far more richness of color than can be got with marble. These might be glued on sheets by a skilful hand in such a way as to form designs of a value infinitely superior to anything yet attempted in floor or permanent wall decoration, and at a price by no means extravagantly high.

SOME English architects recently had an experience of a kind quite familiar to many of our readers, who will be glad to know how their brethren came out of it. The firm of Corbett & Son, architects, of Manchester, brought suit against Messrs. Richmond & Chandler, manufacturers, for balance of commission for services as architects in the erection of new premises in that city. The defense was the usual one, asserting negligence on the part of the architects in taking out quantities, and measuring up the work after completion, resulting, as the defendants said, in the giving of certificates to the contractors to the amount of about twenty-seven hundred dollars in excess of the sum properly due. Two architects gave evidence on behalf of the plaintiffs, and the mechanics employed on the building testified as to the character and quality of the work, and the interference of Mr. Richmond while it was going on; and another architect and two building surveyors, besides Mr. Richmond and his foreman, who acted as clerk-of-the-works, testified for the defendants. A referee was appointed by the court to hear the testimony aud determine as to questions of fact. After five days hearing, the referee reported that the first allegation of the defendants, that the

plaintiffs did not do their work properly, he did not think was supported by the evidence. There were only two other claims, one being that the plaintiffs' measurements were wrong; and the other that their prices were wrong. As to the first, he found that the architects' measurements, and those made by the agent of the defendants, differed only by three-quarters of one per cent; and it seemed to him to be "really nothing but absolute nonsense" to charge an architect with negligence in respect of measurements differing so little from those of the other side. In regard to the second question, whether the prices were fair, he was of opinion that the weight of evidence was "distinctly in favor of the plaintiffs." In summing up, he said that his conclusion was that negligence was not proved by the defendants; and he would go further, and say that "he did not remember any case in which negligence had been charged against a professional man with so little evidence to support it," and that in his opinion the counter-claim totally failed.

BEFORE many months passenger trains will be able, if the Russian Government should permit, to run directly from Paris to Persia, by way of Vienna, Bucharest, Batoum, Resht and Teheran, and the extension of the line from Teheran in one direction to the Persian Gulf, and in another, by way of Merv, to Afghanistan and a connection with the Indian system of railways, is already in contemplation. Even with the present roads, one may ride three thousand miles southeasterly from St. Petersburg without passing the Russian frontier, and if the schemes of the Russian Government are carried out, and the railway extended to the Pacific, about five thousand miles will be added to the length of the line, giving a route of some eight thousand miles entirely within Russian territory. Our own transcontinental roads sink into insignificance in comparison with such railways as this, and the completion, even of the comparatively short link needed to connect India with the European lines through Russia, will be likely to bring about some curious commercial, if not political changes.

THE REVUE SCIENTIFIQUE has published some novel statistics about the consumption of "modern excitants," in which it includes alcohol, coffee, tea and cocoa, and tobacco. The statistics seem to be made up from the official publications, showing the revenue derived from the manufacture or importation of these substances, divided by the factor representing the amount of tax per litre or kilogramme, as the case may be. From these figures it appears that the largest consumers of alcohol in the world are the Danes, who imbibe on an average nearly nine quarts apiece every year. The United States seems to come second, with a consumption of nearly six quarts; and the next place is disputed between the Dutch, Belgians, Russians and Germans, who absorb nearly equal quantities, averaging about four quarts and a half per head annually. Sweden, France and Austria are more temperate still, probably from the preference given in those countries to light wines and beer over whiskey and schnapps. England comes next, with a consumption of two and seven-tenths quarts; and then Norway with one and seventh-tenths, or less than one-fifth the quantity drunk per head in Denmark. Norway, by the way, has, by persistent temperance agitation and heavy taxation, reduced its annual average consumption of alcohol to one-half what it was thirty years ago, and is said to be the only civilized country in which any perceptible diminution has been observed during that period. Italy appears to be naturally a very temperate country, requiring annually only nine-tenths of a quart of alcohol per head to keep the spirits of its inhabitants up to a proper height.

IN regard to the consumption of tea, we have no figures for the United States, but it will not surprise tourist amateurs of the cheering cup to learn that three-fourths of all the tea brought to Europe is drunk in the kingdom of Great Britain and Ireland. Of the remaining portion, Holland, where tea is very popular among the richer classes, takes about one-half, and Denmark and Russia the rest; the people of the latter country, notwithstanding its samovars, consuming per head only about one-thirteenth as much as their English brothers. Of coffee, the Belgians are the largest consumers, the people of the United States coming next, and the Norwegians third. Germany and France consume about half as much per head as Belgium, Austria about one-fifth, and England less than one-tenth as much. In Russia, coffee is practically unknown among the lower classes, and an average of two-fifths of a pound per year apiece contents the inhabitants, as it does those of Roumania and Spain, while the Belgians need nine pounds in the same time. If the Spaniards do not care for coffee, they like cocoa, of which they consume, in various forms, eight pounds each per annum, while the French are satisfied with about six pounds. Elsewhere in Europe the consumption of this substance is insignificant.

THE foreign newspapers give a sad picture of recent building operations in Rome. As in Paris a few years ago, so in Rome within the past year or two, there has been a furious speculation in new building, and, as in Paris, a large part of the new houses seem destined to remain without tenants or purchasers, to the ruin of those who have invested money in them. Already one speculating builder, who employed about four thousand men, has gone into bankruptcy, with enormous liabilities and small assets, and so many others are expected to follow that, to avoid the disturbances which might result from turning so many unpaid mechanics into the streets, the municipal government is said to be disposed to intervene, and advance money enough to insolvent contractors to keep them on their feet a little longer. One could have more sympathy for the Roman builders if they had shown somewhat greater respect for the relics of their noble ancestors, but speculation rarely wastes any time on sentiment, and the most interesting remains of Republican Rome have been ruthlessly shovelled away to lay the foundations of new buildings. In excavating, for instance, for the new Palace of Finance, the workmen laid bare a portion of the fortification of Servius Tullius, containing the famous Porta Collina, through which the Gauls, after a defence carried on by geese as well as men, entered the city and put the inhabitants to the sword, nearly thirteen hundred years ago. We all remember the story of the victorious Gaul, who, rushing among the first into the captured town, found an old man sitting on the steps of a house. He pulled him by the beard in derision, when the old Roman turned his head and looked at him with such dignity and courage that even the barbarian was abashed. It is a pity that the modern contractor could not have unearthed one of his ancestors at the gate, whose eagle eye should forbid further desecration; but neither external nor internal miracles intervened to check the work, and the gate, through which led perhaps the track of Tullia's chariot wheels, dripping with her royal father's blood, was swept forever out of existence. In another place, a cluster of Catacombs on the Via Salara, containing at least seven thousand inscriptions, together with painted decorations, was completely cleared away, the sculptured stones, the priceless relics of early Christian faith and suffering, being scattered in all directions. More building operations are said to be in contemplation in the region of the Catacombs, and it may not be long before they are entirely destroyed.

A FIRE in a fireproof building in Boston the other day caused an amount of annoyance which a conflagration of ten times the extent would not usually have been able to produce. The operating building of the Edison Electric Company, containing seven engines and fourteen dynamos, which supply current to incandescent lights in many theatres, hotels and other buildings, and electric power to a large number of elevators and other machinery, was set in a blaze by a short circuit in an equalizer box, as is supposed, and the interior of the structure was quickly consumed, cutting off the Edison circuits from the entire city, while fire communicated to several adjoining buildings, doing a good deal of damage. The Edison building had been fitted up expressly for the business of the company and is said to have had brick floors and partition-walls throughout, but for convenience or appearance, or both, the brickwork had been sheathed, and this dry material, in the best possible condition for burning, blazed so fiercely as entirely to repel the efforts of the firemen. The next adjoining building, as it happens, is the scenery-room of the Park Theatre. Fortunately, the fire did not penetrate the dividing-wall, but it cannot be said that an electric-light station is the best sort of neighbor for a theatre.

ARCHITECT, OWNER AND BUILDER BEFORE THE LAW.[1] — III.

.Mosque in Algiers. after L'Architecture

IF a person should be so very foolish or careless as to agree to what he did not intend, either by reading the proposition submitted to him carelessly, or not reading it at all, as sometimes happens, he will get no help from the law in trying to avoid the obligations which he has inconsiderately undertaken. No matter how oppressive or harsh the terms may be to which he has given his assent, the courts will enforce them strictly, if they do not demand anything impossible or illegal, or if no fraud can be shown to have been practised upon the party who seeks relief. To use a judge's words, the law cannot make a new contract between the parties: by writing and signing the terms to which they agree, they establish a law unto themselves; and courts, in the absence of illegality, impossibility or fraud, can only give effect to their own terms, defining them, where they are obscure, but not altering them. Even where one of the parties has signed a written agreement upon the verbal representation of the other that certain objectionable clauses will not be enforced, or will be interpreted in some favorable, but not obvious way, he is likely to find that these encouraging promises will be forgotten when the time comes for carrying them into effect, and that he is bound to the strict letter of the contract; the rule of law being that verbal explanations, modifications or understandings in regard to the subject-matter of an agreement are abolished and annulled, or rather, absorbed, by the written contract, which is presumed to be the final and perfect expression of the intentions of the parties. So strictly is this rule maintained that evidence to show that either party promised verbally to waive one of the stipulations, or not to enforce another except in certain contingencies, or to regard a third as "a mere form," is not even listened to in court, where nothing but the exact letter of the agreement, interpreted by the aid of common-sense and the dictionary, receives any attention. Illustrations of this will be given later, in treating of contracts with builders.

Where a contract, whether written or verbal, fails to describe all the duties of the parties to it, the law will supply certain stipulations to fill vacancies. Thus, if, as often happens, an architect is engaged to perform certain services, without any agreement between him and his employer as to the compensation to be paid him for those services, the employer is by law presumed to have agreed to pay a reasonable price for them, and can be compelled by legal process to pay this reasonable price. It should be observed, however, that in order to put a person under obligation to pay for services rendered him, it must be shown that he asked for them, or, at least, that he accepted the benefit of them, which is in law equivalent to a prior request. The legal principle is that no man can make another a debtor to him against his will, and voluntary proffers of sketches or other services impose upon the person to whom they are offered no obligation to pay for any of them, unless he has previously promised, as is usual in competitions, to accept one or more; or unless he accepts one of his own accord, or makes such use of it as to show that he derived some benefit from it. In either of these cases he is bound, unless he has made some agreement to the contrary with the person whose work he wishes to avail himself of, before he accepts it or takes the benefit of it, to pay what such services are fairly worth. Perhaps the cases to which architects are parties involve this principle more frequently than any other. The loose way in which competitions are carried on, with the carelessness of some architects in volunteering services which they are not sure of getting paid for, have led to an uncertainty in the matter of an architect's employment which is unknown in other professions. No one, for instance, imagines that a lawyer or doctor would spend his time and skill in preparing briefs or prescriptions which were not to be paid for unless satisfactory, and with them the evidence of the service rendered is usually all that is necessary for securing payment; but architects often find their efforts to obtain compensation for their work resisted by a claim that their services were only to be paid for if accepted, or that they were, by special agreement, to be rendered gratuitously.

It is unfortunate for the profession that this claim is in some instances well founded; and the practice indulged in by certain architects, of volunteering plans, or soliciting opportunities to "submit sketches," although it has, in years past, been sanctioned by rather illustrious examples, tells seriously against the conscientious men who believe that all their work ought to be paid for at a fair price; and in the end injures the speculators themselves, who find their assertions discredited when they really believe themselves to have been legally employed.

When cases of this kind come before the courts, it is for the jury to decide from the evidence whether the work was volunteered, or done in return for a promise that it should be paid for; and, in general, it will be necessary for the architect to give some proof that such promise was made, or that he did the work in accordance with such a request of the other party as would imply a promise to pay for it. An architect in Illinois, a resident of a certain village, was once called upon by a member of a committee, who told him that the citizens of the town intended to build a factory, and present it to a firm of manufacturers, as an inducement to the firm to remove its business to the place; and the visitor proposed that the architect, as his contribution to the cause, should prepare the plans and specifications for the building. He did so, and afterwards sued the committee-man for payment for them. The court found that no promise was shown on the part of the committee-man to pay for the plans, and that the architect could recover nothing. In a recent case, an architect, meeting frequently the principal manager of an operatic company, became interested in the plans of the company, and made drawings for an opera-house in accordance with the suggestions of his friend, who promised to use all possible influence to have them adopted by the company. Nothing more coming of the matter, the architect sued his enthusiastic acquaintance for payment for the drawings, but was defeated, on the ground that no promise had been made to pay for them.

On the other hand, if a promise is really made, or any inducement held out, by which an architect is led to spend time and trouble, he has only to show this to the satisfaction of the jury, and the court will see that he is paid. In a New York case one Nourry, an architect, sued the owner of a lot on Broadway for the value of his services in making plans for the improvement of the lot. Nourry, corroborated by another witness, testified that he was employed to draw plans for a building to be erected on the lot, and did so, and submitted them. The defendant said that Nourry came to him with an introduction, and said that he would like to show him what he could do, and would draw some plans and submit them to him. He replied that his intentions as to building were entirely unsettled, and that Mr. Thomas was his architect. Some time later, Nourry brought a lot of drawings to show him. He told him that he thought they were beautiful plans, but not adapted for use; and soon after, Nourry sent and took them away. He denied that Nourry had ever been employed by him in any way. In this case the jury believed that the conversation between the parties amounted to an employment, and the court ordered judgment for the architect.

[To be continued.]

[1] Continued from No. 572, page 276.

SIXTEEN CENT GAS.— One of the great gas companies in Philadelphia confesses to being able to make fuel gas at a cost of 16 c. per 1000 cubic feet, in the holder ready for distribution, by the use of a bench of coal retorts in connection with water-gas generators such as are in use at the Krupp works in Essen, Prussia. In a communication to *Light, Heat and Power* the exact figures are given for a daily make of 260,000 cubic feet, which amounts to exactly $40 — or less than 15 1-2 c. per 1000; and it is significantly added: "With a gas of this kind selling at 25 or 30 c. and the Welsback incandescent gas burner giving a 20-candle power light from 2 1-2 or 3 degrees of gas, we might say the gas business has just commenced."— *Exchange*.

THE ROYAL ACADEMY: THE ARCHITECTURE.

Church of the Redeemer, Lexington, Mass. E. A. P. Newcomb, Architect.

IN the architectural room we have again to regret the absence of the architect Academicians; Mr. Pearson, Mr. Norman Shaw and Mr. Waterhouse contribute nothing to the gallery. Neither does that distinguished Associate, Mr. Bodley. Their absence is a distinct loss of interest to the exhibition; more than that, it is scarcely fair to the profession that out of the six architects in the Academy four should not be represented in the only yearly display of architecture we can apparently manage to get up with any chance of success. Election to the Academy is, or ought to be, a high honor, and honors are not without their duties. It is, therefore, disappointing to find this year even worse than others of late in the conspicuousness of well-known names by reason of their absence. Perhaps Mr. Waterhouse's illness — and we regret to hear he is still far from well — may have had to do with it in his case, but what about the others? It cannot be said, as with Mr. Burne-Jones among the painters, that the conditions of the hanging and surroundings are injurious to the effect of their works. They have the architecture pretty much in their own hands, and can hang what they like and how they like. It does not look as if the honor were very highly valued among its possessors.

Of the remaining members of the Academy, Mr. Aitchison sends nothing of an architectural character — only the decoration of the ceiling and side of a drawing-room, of no particular interest whatever, so that Mr. Arthur Blomfield, the newly-elected associate, is really the only official representative of architecture at Burlington House this year. He sends a drawing of the "Entrance to the new Building" he is engaged on at historic Eton, his "New Church" at Glanadda in Wales, and the "South Porch of the Church of St. Mary," Portsea. All these works are in the phase of Perpendicular English Gothic that Mr. Blomfield is so familiar with, all very scholarly and very correct, but somewhat hard and uninteresting. This is to be regretted most at Eton, perhaps, where it will suffer from comparison with the picturesque old work of the time-honored college. The porch of St. Mary's is the best of the lot, — probably Mr. Blomfield is more at home in church work than anything else. However, let us be thankful even for small mercies. As has been pointed out, had not Mr. Blomfield come to the rescue, we should have had no architecture at all from the members of "*The* Royal Academy of Arts," a nice thing for the "*Mother* of the arts!"

Of the outsiders there are as usual far too many drawings and sketches of old work, some of which, as, for instance, the drawing of a steel sword-hilt, a bronze standard-bearer, and an Etruscan candelabrum, though very beautiful in themselves, have little or nothing to do with architecture as such apart from mere draughtsmanship. So, also, with the designs for stained-glass windows and interiors of rooms, many of which are not worth the valuable space they occupy on the walls. They represent nothing and teach nothing, and if what we hear of the number and quality of the rejected architectural works be anything near the facts, we certainly think their authors have a fair right of complaint that the space should be taken up with such works as we have just noticed. Architecture and the kindred arts by all means, but not the latter to the undue exclusion of the former. This sort of thing has been growing year by year lately and this year it is worse than ever. It is small encouragement for architects to send good drawings of their works, only to find them sent out to make room for students' sketches of old examples, however interesting, and designs by "eminent firms" for stained glass and decoration, most of which is of a very commonplace order. We should be the last to decry the benefits of clever drawing, but draughtsmanship is not architecture, though it may do much to represent it in a favorable and popular manner.

Mr. Collcutt's revised design for the "Imperial Institute" occupies the place of honor on the east wall, shown in a very beautiful pen-and-ink drawing: well, it is improved, particularly in the treatment of the tower, though that feature is still somewhat weak, but it has generally been thought out with great care, some of the smaller features have been suppressed and the larger and simpler more emphasized, to the manifest advantage of the whole design as a composition; but it still sadly lacks the grandeur and dignity we associate with the idea of anything imperial, except an "Imperial Hotel," which it still resembles more than anything else.

Two of the other designs from the recent competition are here. Those by Messrs. Deane & Son, of Dublin, and Messrs. Webb & Bell, of London. They have been already described in the pages of the *American Architect.* Messrs. Deane's design still bears the palm in all that speaks of the imperial idea, and we are forced to admit that another great opportunity has been lost in the matter of our public buildings, and we fancy this will be found out ere another ten years have passed. There are several other notable competition designs on the walls; viz., Mr. Brook's Liverpool Cathedral, shown in three magnificent pen-and-ink drawings of great vigor and power; Mr. Emerson's for the same cathedral by a very good water-color of the interior; Mr. R. Chisholm's design for the "Bombay Municipal Offices," two drawings in the Anglo-Indian style in which he has done so much, with a great dome and other Eastern features cleverly worked out; Mr. J. M. Brydon's design for the "Edinburgh Municipal Buildings," shown in two elevations, in English Renaissance, also with a dome and towers, but in marked contrast to the Bombay example; Mr. J. Coates Carter's design for the west front of Milan Cathedral, a pretentious elevation in a florid style of Gothic; two of the designs, one by Mr. William Leck and the other by Mr. Boney, in the Academy Students' Competition for a railway-station, both clever, but the former, Mr. Leck's, particularly so: it is Greek in treatment and feeling, admirably drawn, and thoroughly-well detailed. If we had such a railway-station in London, we should have something to be proud of; even Mr. Ruskin might be reconciled to railways through its influence.

Taking the ecclesiastical drawings in the order in which they come in the gallery, the first worthy of notice, and we had nearly written, the first in point of merit and drawing, is the new Roman Catholic Church at Folkestone by Mr. Leonard Stokes, shown in three views, an interior looking east, an exterior of the west front, and an interior of the Lady Chapel. For beauty of execution and expression, these drawings are almost without a rival in the room, and they show a church of late type, with a good deal of originality of treatment very thoughtfully and artistically worked out and altogether the most creditable piece of church work seen in the Academy of late years. The treatment of the triforium over the double-aisle columns is particularly worthy of notice.

In contrast to this quiet work is Mr. J. D. Sedding's New Church of the Holy Trinity, Chelsea, shown in two drawings, an exterior of the west front and an interior looking east. It is curious to notice the resemblance *in plan* between these two churches; they are strikingly alike and yet both quite out of the ordinary type of arrangement. But here the similarity ceases. Mr. Sedding is nothing if not original and some very clever churches he has given us. Here at Chelsea, though adorned with a quantity of sculpture, the effect is somewhat restless and garish. Both the east and west windows are filled with tracery of a questionable character. The church is in late Gothic, and throughout the wide nave and aisles and the west front, in bands of different-colored stone; there is a want of repose and a certain wildness which we feel sure Mr. Sedding will yet subdue. It is hardly the great town church we have a right to expect from an artist of his well-known powers.

Mr. J. O. Scott sends his design for the new bell-tower for the old Church of St. Michael's, Coventry, a fine tower in late Gothic, quite in keeping with the old work. Another very fine example of fifteenth-century Gothic is the Parish Church of St. Mary, Hornsey, by Mr. James Brooks. This looks like a veritable old English church, with a tower at the west end, a long, well-defined, clerestory chancel, with square east end and north porch, all with a typical English flavor about them, which is quite refreshing after the strong early French Mr. Brooks has given us so much of. Near this is Messrs. Dun & Hanson's "Interior of the Chapel at Stonyhurst," an extraordinary example of how fifteenth-century features may be misused. Then a small picturesque church by Mr. Sedding, "All Saints'," Falmouth, cleverly treated.

Messrs. Carpenter & Ingelow send an important work, the new choir and central tower, with restorations of transept and lady chapel, for works of Priory Church, in early Gothic and again exactly like the old work in spirit and design. The square central tower might be mistaken for the original one, of which perhaps it is a reproduction. Still another fine late Gothic church is shown by Messrs. Clarke & Micklethwaite, in a well-drawn side elevation, with very good detail.

The Mackonochie Memorial Chapel, St. Alban's Church, Holborn, by Mr. Charles Mileham, is interesting both on its own account and its associations. It is in fifteenth-century Gothic, quite unlike the early work of Mr. Butterfield's church but with a distinctive character of its own.

Among the civil and domestic or collegiate works, those of Mr. J. G. Jackson take as usual a high place. His principal contributions are three drawings of Brasenose College, Oxford. The new "Front to the High Street," the "Interior of the new Quad" and the "Interior of

the new Reading-room." The front is in every way a vast improvement on that exhibited last year, instead of the thin lifeless tower with the open crown, we have now a sturdy, well-drawn square tower flanked by a range (on each side) of charming gables fronting the celebrated High Street, designed in vigorous English Gothic of the regular Oxford type and handled with the freedom and grace for which Mr. Jackson is well known. The new quad is a most notable addition to the architecture of Oxford and in every way worthy of its conspicuous position. Mr. Warren sends a nicely-tinted drawing of the new "Barge for Magdalen College Boat-club," Oxford, a quaint reproduction of a seventeenth-century galley with a high poop-deck.

Messrs. Ernest George & Peto send no less than eight works, the full number, though some of them are hardly worthy their reputation for picturesque architecture, and most of them are small or unimportant. Among them is Mr. George's own house under the modest title of a "House on Streathan's Common." It has all the characteristic features of his work in full play and is just the sort of place we should expect to find him at home in. It is always interesting to see the kind of houses artists build for themselves. The largest work they send is "Batsford" Gloucestershire, a big house which is not at all interesting: it is simply odd and looks almost as if its author hardly knew what to do next.

In marked contrast to all these houses is the work of Mr. John Belcher, who sends six drawings, all full of interest, and thoroughly artistic in every way. Four of them represent portions of a large house at "Stowell Park," and give us the staircase, the lower hall, the drawing-room and the cloisters. Fine old English looking domestic work all of it. The staircase is most picturesquely arranged and the lower hall with its quaint fireplace is quite a gem. The drawing-room has a large fireplace with columns to the chimney-piece and rich carving above, reminding us of one of Mr. Shaw's a few years ago. "Morden Grange" is shown in bird's-eye perspective with the Dutch-looking garden beyond. The remaining drawing, "The Stables" at Northleach, is the interior of the court-yard, even more picturesque than ever though vigorous in drawing and design. It is chiefly remarkable for a quaint colonnade of stumpy columns, an angle dove cot and clock gable.

Apart from the Institute design, Mr. Aston Webb sends only a drawing of the new vicarage at Wick, Pershore. This is a very charming design shown in a most lovely drawing. It is quiet and homely and English-like. The drawing is by Mr. Charles Mallows who sends on his own behalf a "House on the Severn," near Upton in Worcestershire, a beautiful riverside house shown in one of the most dainty drawings in the whole room. The house is built close up to the river which washes its terrace wall and seems to form part and parcel of the design. It has more the appearance of having grown into shape in the course of time than a new house, so thoroughly does it fit in with its surroundings of wood and water and so admirably is it depicted.

"Victoria Coffee-house, Leicester," by Mr. E. Burgess and the "Free Library at Chester" by Mr. T. M. Lockwood, show what interesting work is being done in the country towns. The former has a kind of French-château feeling about it though the upper portion does not look as if it quite belonged to the lower. Mr. Lockwood's library is in the fine half-timbered style for which Chester is famous, is shown in a capital drawing and is altogether a very clever work.

Mr. Reginald Blomfield gives us a very good bit of Queen Anne work in the "New Buildings" for Haileyburg College, and there are also some clever schools such as Mr. Bailey's Board School at Lavender Hill. Messrs. Mitchell & Butler's design for Colfe's Grammar School at Lewisham Hill, distinguished by a very picturesque tower with porch under, and quiet good work in the main building, also some picturesque dairy-farms on the Eaton estates by Messrs. Douglas and Fordham of Chester, in the familiar Cheshire manner. What would be called an apartment-house in the States is shown by Mr. Basil Champney's "Park Mansions," a building of prodigious height and no end of suites of rooms, but not very remarkable otherwise. Mr. Arthur Haynes sends a good drawing of a house at Highgate, in the old English manor-house style, drawn in elevation and reminding one of Mr. Shaw's "Dawpool" in Cheshire.

"The London and River Plate Bank, Rosario," by Mr. William Kidner is a very good piece of Classic, one of the very few examples of buildings for commercial purposes, as also, though in quite a different style is Mr. Halsey Ricardo's "Offices in St. George Street, Westminster." This last is a striking feature with its glazed red-brick front, and white woodwork amid the dull gray houses of St. George Street.

Among the decorative work are some extremely interesting examples in fresco duro by Mr. Aldham Heaton, very cleverly designed and colored, and which give quite a new feature to the walls of the gallery. One in particular, part of a frieze in sprays of olive and vine, is gracefully drawn and admirably modelled in very low relief, helped by skilful coloring. As we have said there are many, too many, examples of decorative work, and many, too many again, very beautiful drawings of old work, but they are only interesting in a limited sense, and beyond a word of praise to the wonderful draughtsmanship do not call for any special notice.

In going through the room we have only picked out the most notable works, doubtless, there are others well worth attention, as in spite of the absence of the Academicians, the general work is of a high average and quite sustains the artistic reputation of the profession.

SOME AMERICAN MONUMENTS.[1] — III.

MEMORIALS TO WILLIAM PENN.

Statue of William Penn, in front of the Pennsylvania Hospital.

AS early as the year 1660 an attempt was made at the suggestion of George Fox, the English Quaker, to purchase a territory of the Susquehanna Indians, for the purpose of a settlement for the sect to which he belonged. This failed, because of tribal wars among them. The visit of Fox to America in 1671, strengthened his desire for a settlement, where those who wished to do so might remove with their families and enjoy the worship of God without molestation, and where their children might have proper social surroundings. It was, however, found very difficult, for the coast from Maine to Florida was either colonized or claimed, and it was not until Lord John Berkeley offered for sale his interest in New Jersey that an opportunity was afforded the Quakers to make such a purchase as they long desired. This opportunity was eagerly seized upon by Edward Byllinge and John Fenwick, both of whom belonged to the Society of Friends, but who, in this matter, acted in their individual capacity. Disagreements occurring between these two, William Penn kindly consented to act as arbitrator. Pecuniary embarrassments occurring to Byllinge, he transferred to his creditors his interest in New Jersey. Again the aid of Penn was sought, and he consented to act as joint trustee with two of Byllinge's creditors in the New Jersey estate, and thus for the first time became personally engaged in the establishment of an American colony. It is thought probable that his connection with the affairs of New Jersey determined the establishment of the Pennsylvania Province by him ten years later.

It is true that a regard for the aborigines of America, and a desire to do something for their welfare, had long occupied his mind. "I had an opening of joy as to these parts," he writes, "in the year 1661." This interest was deepened by his acquaintance with the affairs of the country as trustee for Byllinge by his association with Barclay, even before the latter became Governor of East Jersey, by his conferences with George Fox, and by his desire himself to found a colony where freedom of conscience should be regarded as the inherent right of every citizen.

This desire was soon gratified, for on October 24, 1682, William Penn landed at New Castle, Del., and in November he made a treaty with the Delawares and other tribes. The particular spot at which the treaty was held is said to have been under a venerable elm that stood on the banks of the Delaware river, at what is now known as Kensington, a part of Philadelphia, but of this there is no record. He said to the Indians, "I will not call you children, for parents sometimes chide their children too severely; nor brothers only, for brothers differ. The friendship between you and me I will not compare to a chain; for that the rains might rust, or the falling tree might break. We are the same as if one man's body were to be divided into parts: we are all one flesh and blood." To this the Indians replied, "We will live in love with William Penn and his children as long as the sun and moon shall endure." And they fulfilled this treaty. It is often said that not a drop of Quaker blood was ever shed by an Indian; and, though this is not quite true, yet it is true that Pennsylvania and New Jersey suffered much less than most of the other colonies. Pennsylvania is said to have been the only colony where the evidence of an Indian was taken in court against a white man; and the Indians proved themselves worthy of this just treatment. Penn's treaty with the Indians has always been famous as one that was never broken. Nearly a century afterwards, when the American colonies were fighting for their independence, the commander of the English army placed a sentinel under the tree to protect it from his soldiers who were cutting down the surrounding trees for fuel. It was carefully preserved until 1810, when it was blown down.

The successors of Penn did not always continue his generous treatment of the Indians, and many anecdotes are told in illustration of how the low cunning of the white man overreached the rights of the Indians.

THE PENN BUST.

In 1802 James Traquair executed a bust in marble of Penn, and presented it to the Pennsylvania Hospital. It is said to be the first bust ever made in the United States.

THE PENN STATUE.

The Penn statue was originally the property of Sir Francis Dashwood, who was Lord Le Despencer from 1763 to 1781, and stood in West Wycombe Park, England. Dashwood's successor did not

[1] Continued from page 220, No. 646.

admire the founder of Pennsylvania, and sold the statue for its value as lead. It was afterwards found in a London junk-shop by a grandson of Penn, who bought it and presented it to the Pennsylvania Hospital. It is made of lead and painted an olive green, and stands in front of the above institution. On the face of the plinth are these words: "Presented by JOHN PENN, A. D. 1804."

Upon the open scroll that the statue holds in its left hand, are these words:

CHARTER
OF PRIVILEGES TO
PENNSYLVANIA MDCC.

ALMIGHTY GOD
BEING THE ONLY
LORD OF CONSCIENCE
I DO GRANT AND DECLARE
THAT NO PERSON
WHO SHALL ACKNOWLEDGE
ONE ALMIGHTY GOD
AND PROFESS HIMSELF
OBLIGED TO LIVE QUIETLY
UNDER THE
CIVIL GOVERNMENT
SHALL BE IN ANY CASE
MOLESTED —— (rest defaced.)

The face of the pedestal of the statue bears this inscription:

WILLIAM PENN,

BORN	Penn	DIED
1644	arms	1718

The words, "Mercy-Justice," are inscribed on the arms.

The pedestal is engraved with the following inscriptions on its other three sides:

PENNSYLVANIA
GRANTED BY
CHARLES II
TO
WILLIAM PENN
1681.

RETURNED TO PENNSYLVANIA
1699
AND FINALLY WITHDREW
TO
HIS PATERNAL ESTATE
1701.

THE PROPRIETARY ARRIVED
1682
MADE
A JUST AND AMICABLE ARRANGEMENT
WITH THE NATIVES
FOR THE PURCHASE OF THEIR LAND
AND
WENT BACK TO ENGLAND
1684.

TREATY-STONE.

In 1827 the Penn Society afterwards merged into the Historical Society, erected an insignificant stone upon the spot where the treaty is supposed to have been made with the Indians. It is inscribed, on its sides, as follows:

The Treaty-stone.

TREATY-GROUND
OF
WILLIAM PENN
AND THE
INDIAN NATIVES,
1682.
"UNBROKEN FAITH."

PLACED BY THE
PENN SOCIETY
A. D. 1827
TO MARK THE SCITE
OF THE
GREAT ELM TREE.

WILLIAM PENN
BORN, 1644
DIED, 1718.

PENNSYLVANIA,
FOUNDED
1681
BY DEEDS OF PEACE.

The treaty-stone has been for many years surrounded by a ship-yard.

The tower of the new City-hall, Philadelphia, which is to be five hundred and thirty-five feet high, will be surmounted by a bronze statue of Penn, thirty-six feet high, and surrounded by four other figures, twenty-five feet high.

Some years ago an attempt was made to bring the remains of Penn from Jordan's burial-ground, England, to Philadelphia, and place them under the tower upon which his statue is to stand.

In 1886 Congress was asked to appropriate money for a statue of Penn.

Among the Friends, Penn has always been highly thought of, but general appreciation of his character is of somewhat recent growth.

It is entirely at variance with the customs of the Quakers to erect monuments to the memory of the dead, and their influence has been so great for years in Philadelphia that it has prevented any project being set on foot to erect a monument to the memory of Penn.

Not long ago the Pennsylvania Peace Society sent a communication to the President of the Philadelphia Public Buildings Commission, requesting that no more statues of military men be placed about the new City-hall.

Whatever motive the Quakers may have had in not erecting monuments to the memory of their dead, it is certain that in forgetting Penn, in the form of statue and monument, they have done well from an art-point of view. If the thrifty and vain-glorious New England Puritan had done likewise, it would have been better for his reputation in every respect. Unwise actions are often out of mind and may be forgotten, but the frightful objects set up in New England, as statues and monuments, are a continual eyesore, and a permanent confession of pretense and weakness.

T. H. BARTLETT.

THE ILLUSTRATIONS

[*Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.*]

THE GRAND BATTERY AND LAVAL UNIVERSITY, QUEBEC, CANADA.

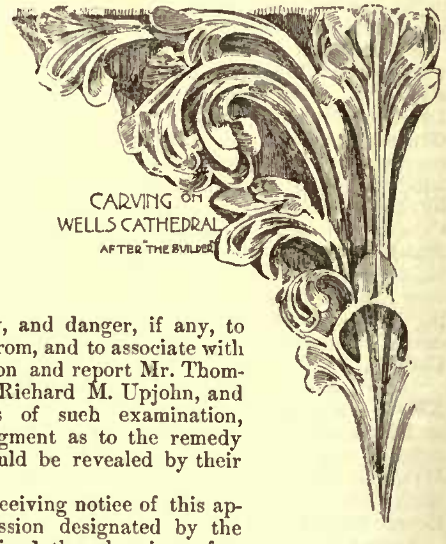
[Gelatine print, issued only with the Imperial Edition.]

THE NEW PUBLIC LIBRARY, BOSTON, MASS. — THE MAIN FACADE; MAIN ENTRANCE; GRAND STAIRCASE; TRUSTEES' ROOM, AND CORRIDOR. MESSRS. MCKIM, MEAD & WHITE, ARCHITECTS, NEW YORK, N. Y.

IN the *American Architect* for May 26, will be found other illustrations of this building.

BIRD'S-EYE VIEW OF COPLEY SQUARE, BOSTON, MASS., SHOWING THE NEW PUBLIC LIBRARY.

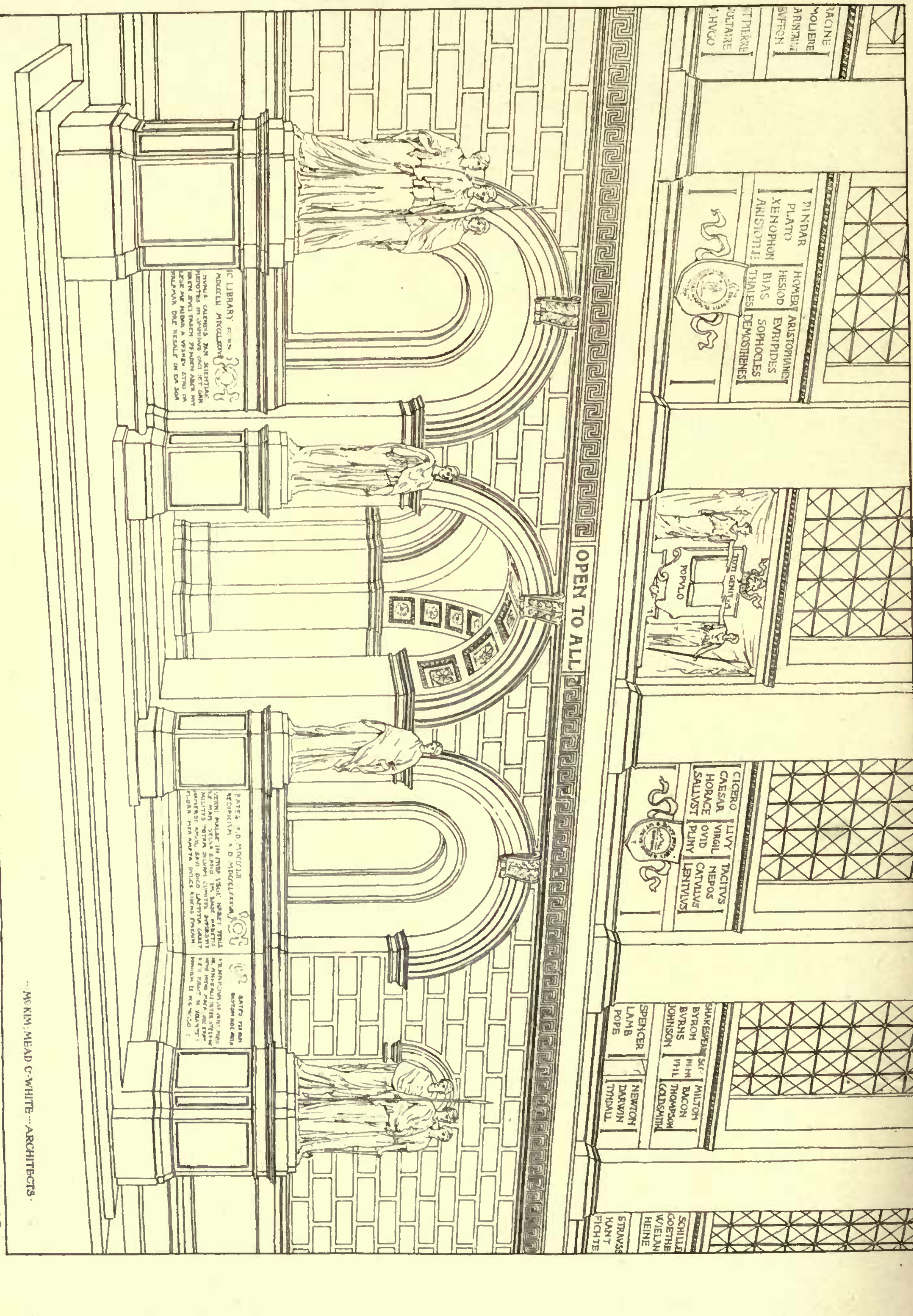
REPORT TO THE GOVERNOR ON THE CONDITION OF THE ASSEMBLY CHAMBER VAULTING AT ALBANY.



SIR,—Under a concurrent resolution of the Legislature the State engineer was requested to cause an examination to be made of the Assembly Chamber in the new Capitol, and particularly the ceilings and foundations and supports thereof, for the purpose of ascertaining its present condition and stability, and danger, if any, to be apprehended therefrom, and to associate with him in such examination and report Mr. Thomas C. Clarke and Mr. Richard M. Upjohn, and to report the results of such examination, together with their judgment as to the remedy for such defects as should be revealed by their investigation.

Immediately upon receiving notice of this appointment the commission designated by the resolution met, examined the drawings furnished, and also made a personal examination of the ceiling of the Assembly Chamber. This examination revealed such a dangerous condition of things that a report was at once made to the Legislature on February 3, 1888, upon the pressing and immediate question of danger. In that report the actual condition of the ceiling was described and reference made to the numerous fractures found in it, and recommendation made that the Assembly Chamber be immediately vacated, that strong and properly-supported centrings be put up, and that the whole of the ceiling be taken down as soon as possible, and such steps taken as would relieve the pressure on the walls and supports.

COPYRIGHT 1888 BY TICKNOR & Co



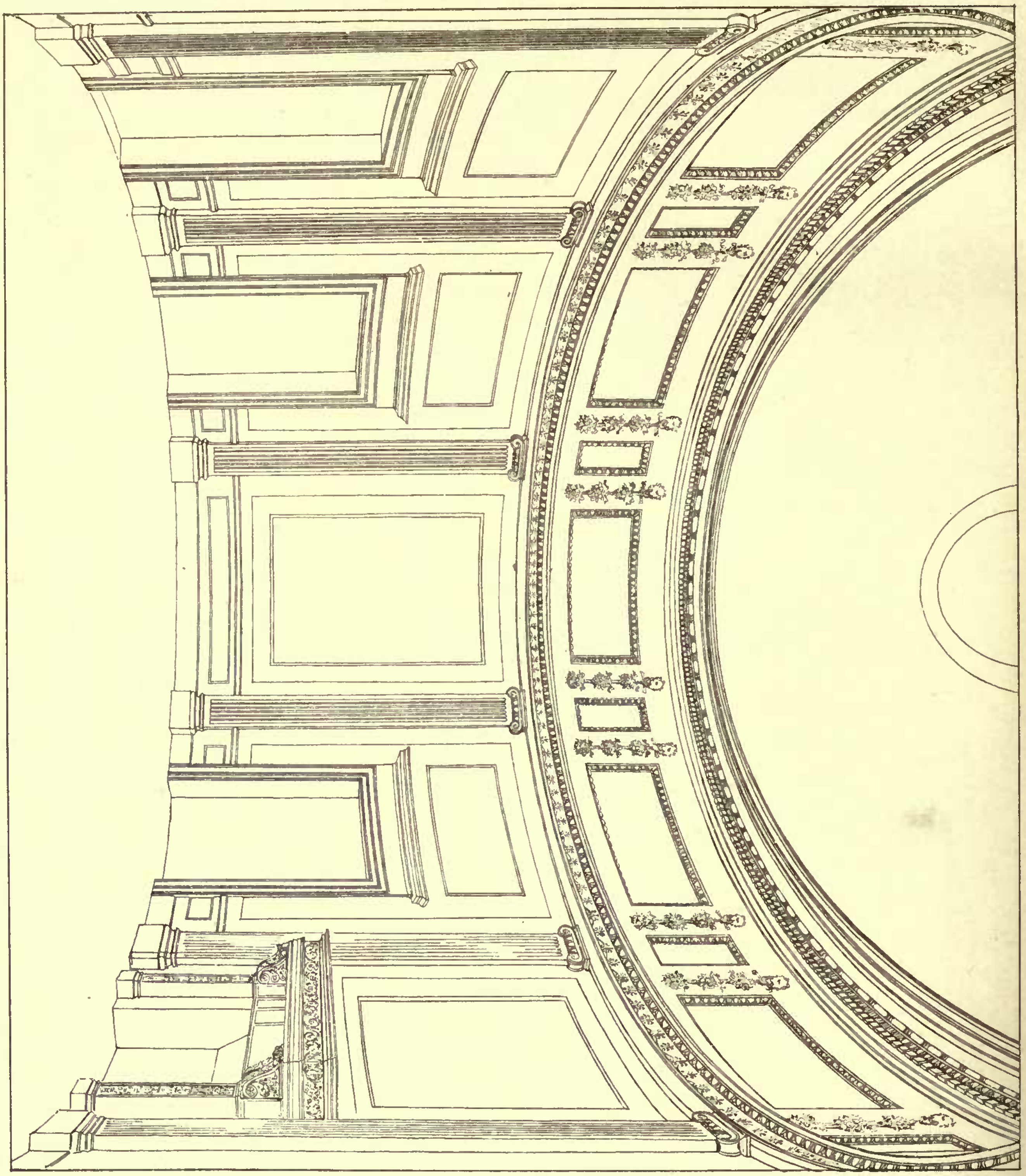
· THE · NEW · PUBLIC · LIBRARY · BOSTON · MASS ·

· DARTMOUTH · STREET · ENTRANCE ·

· McKIM, MEAD & WHITE · ARCHITECTS ·

Heliotype Printing Co. Boston.

COPYRIGHT 1888 BY TICKNOR & CO

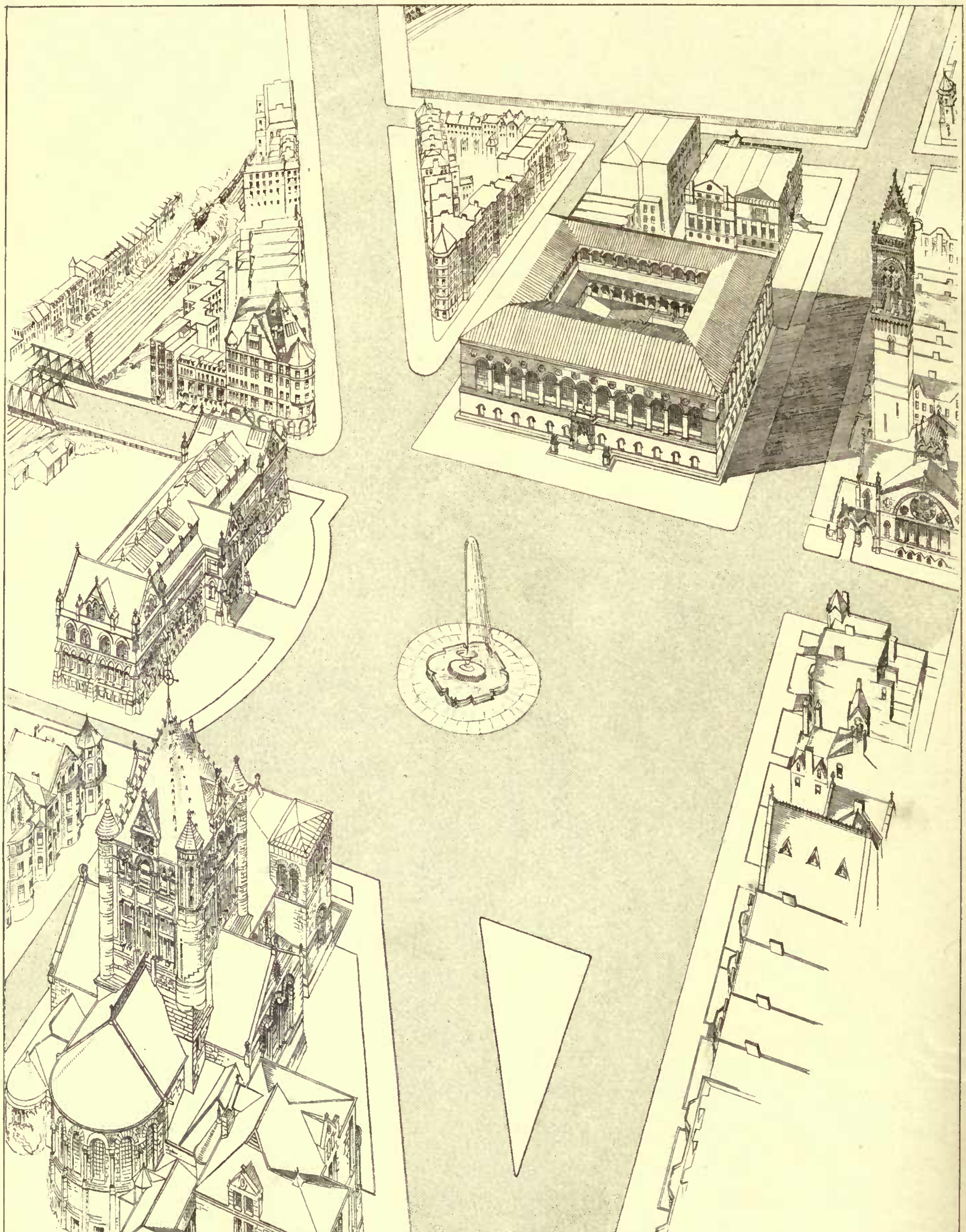


· THE · NEW · PUBLIC · LIBRARY · BOSTON · MASS ·

· TRUSTEES' · ROOM · [23' × 27']

Heliotype Printing Co. Boston.

COPYRIGHT 1888 BY TICKNOR & Co



Heliotype Printing Co. Boston.

·THE·NEW·PUBLIC·LIBRARY· BOSTON·MASS·

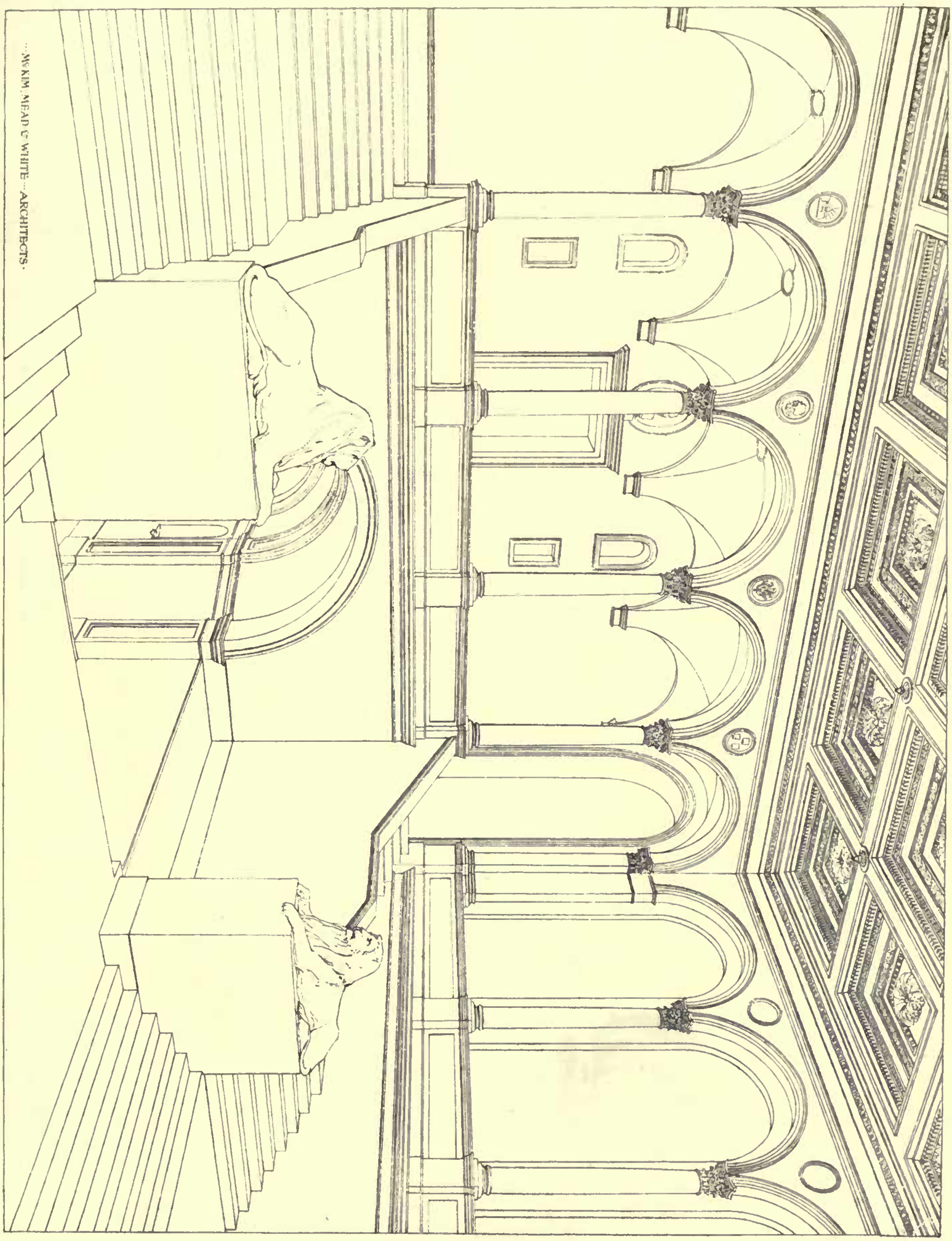
·BIRD'S-EYE·VIEW·OF·COPLEY·SQUARE·

COPYRIGHT 1888 BY TICKNOR & CO.

Heliotype Printing Co. Boston

AMERICAN ARCHITECT AND BUILDING NEWS, JUNE. 9 1888 No. 650

COPYRIGHT 1888 BY TICKNOR & CO



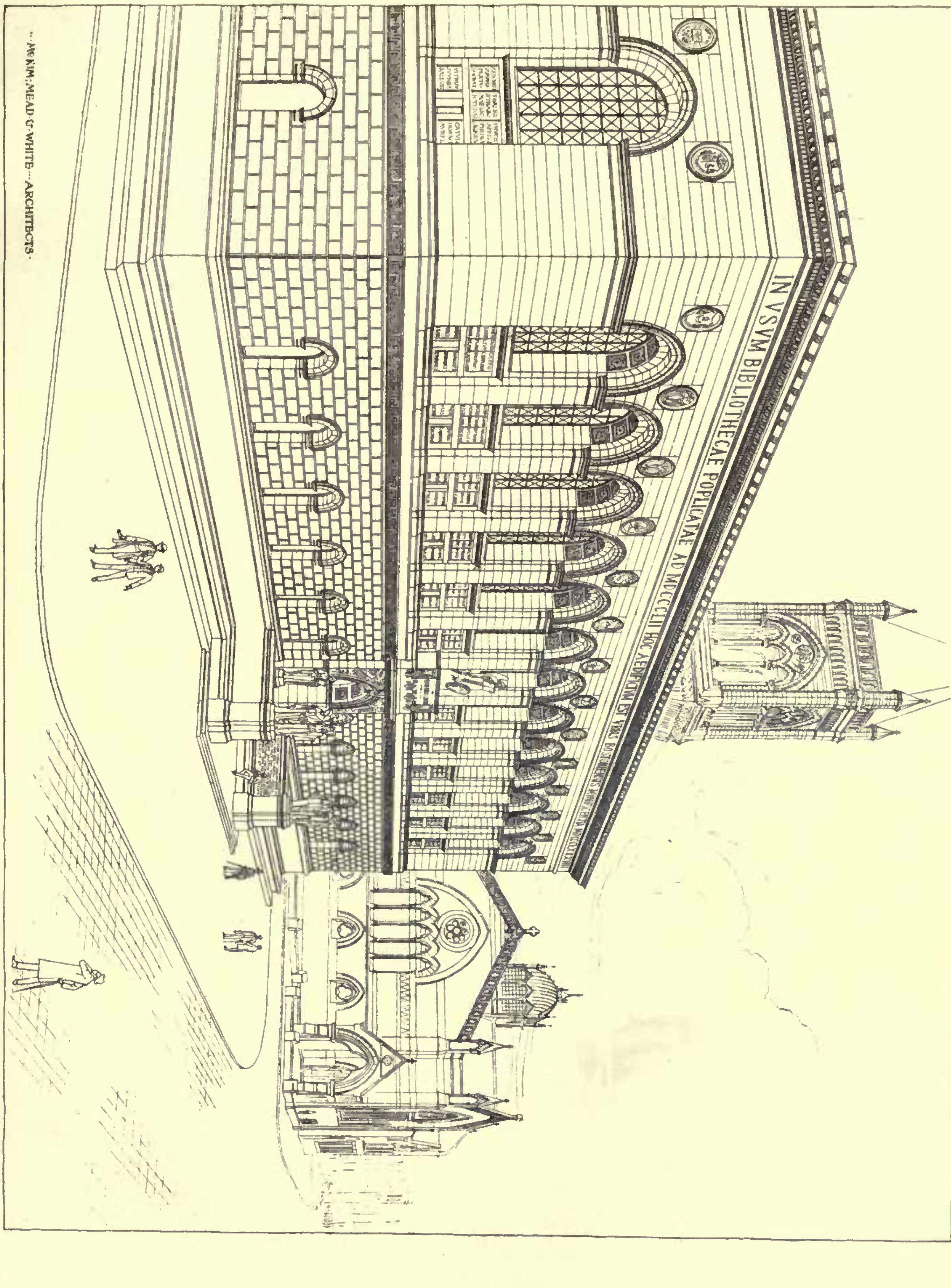
McKIM, MEAD & WHITE ... ARCHITECTS.

·THE·NEW·PUBLIC·LIBRARY· BOSTON·MASS·

·STAIRCASE·HALL·[40'×50']

Heliotype Printing Co Boston.

COPYRIGHT 1888 BY TICKNOR & CO



·McKIM, MEAD & WHITE·ARCHITECTS·

·THE·NEW·PUBLIC·LIBRARY· BOSTON·MASS·

·DARTMOUTH·ST·FACADE.—FROM·THE·MUSEUM·OF·FINE·ARTS·

Heliotype Printing Co Boston.

Action was taken by the Assembly upon this report, and a square tower of timber was erected in the Chamber, its supports being carried to the foundations, and upon it centres were put supporting the ribs of the main vault, and subsequently an additional centre was found necessary, and put in place to support one of the ribs of the northern vault.

At the request of the committee a second report was made on March 7, 1888, confirming the recommendations of the first report that the ceiling be taken down, and adding that its place should be supplied by one of lighter construction and more favorable for Parliamentary purposes.

We now beg to submit a final report.

Before referring in detail to the ceiling of the Chamber, we desire to refer to the condition of the staircase adjacent to that Chamber. This condition is such that it must be repaired, and we judge from the examination that can at present be made, that the repairs may be effected by rebuilding the part below the first floor with new and enlarged foundations. But it is possible that further developments, when the work is entered upon, may show that it will be necessary to take down and rebuild the whole of this staircase. We think, however, that this will not be requisite.

Our examination of the foundation of the structure leads us to say that the base of the main tower, now unfinished, is very heavily loaded, and, in our opinion, it will be unwise to continue a heavy construction for this tower; and, in fact, to add any great weight upon that foundation, without, in some manner, enlarging its area.

Referring now to the Assembly Chamber, and that portion of the building above and below it, we recommend that the following portions should be removed with as little delay as possible after the close of the present session: —

1. All the groining, vaulting, and ribs above the level of the capitals of the columns	1,438 tons.
2. The four cross walls and main arches down to the capitals of the columns	1,172 "
3. The brick and iron floor over the Assembly ceiling	400 "
4. The side walls of three dormers facing on the court	220 "
Total weight removed	3,230 "

The weight of the two gable walls in the attic supporting the chimneys may be transferred by trusses to the walls at the side of the central arch.

It is the opinion of this commission that a design should be adopted for the reconstruction of this part of the Capitol building which will throw upon the walls and foundations as small a weight as is consistent with good construction and proper architectural effect. This can be effected by a ceiling of wood or of metal, constructed so as not to throw lateral pressure on the outer walls, and so as to load the supporting walls below the Assembly floor as little as possible.

It has been stated to us by many members of the Legislature that the acoustic properties of the stone vault of the ceiling of the Assembly Chamber were defective. We have also been informed by a number of members of that body that the acoustic properties have been decidedly improved since the temporary flat ceiling of plank has been in position. This leads to the suggestion that the new ceiling should be flat, and it may be constructed of wood or of metal, possibly with glass panels. It would then be similar in treatment to the ceilings of the Senate or House of Representatives at Washington, or to the ceiling of the Senate Chamber in the Capitol at Albany. Skilled architects can undoubtedly design such a ceiling so as to give to the Assembly Chamber a stately and ornate architectural effect. The weight of such a new construction would be much less than the present ceiling.

The brick and iron floor over the Assembly vault need not be replaced unless possibly by a light fireproof construction as a protection to the new ceiling below.

The side walls of the three dormers should be replaced by metal and slate.

When these weights are removed, and the new weight added, the walls of the rooms below the Assembly Chamber will be relieved of some 2,700 tons of load, and we do not anticipate, in that event, further serious settlements or cracks. We recommend that the golden corridor be repaired by removing the casing of the wall piers and putting in heavy iron girders at the floor level to carry these piers which now rest on brick corbels. New stone must then take the place of that which is now cracked and shattered. The casings of the temporary library should be repaired in the same manner.

When these things are done, and we believe they can be completed before the beginning of the session of 1889, this portion of the Capitol building will, in our judgment, be in a safe and permanent condition, and require only the ordinary repairs.

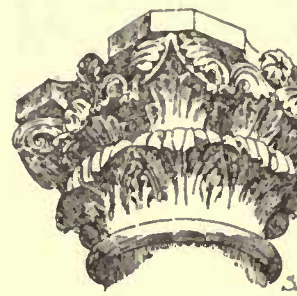
It seems proper that this commission should add that the lamentable condition of parts of this great building is not due to bad workmanship, because the workmanship is really very good. Neither is it due to bad foundations, because we find that the settlement of the foundations has been slight, and not very irregular, while those foundations are, in places, loaded beyond what was intended in the original design and construction. The ruin of the vaulted ceiling is due to the fact that the design and method of construction and loading of these arches and vaults have been such as to give pressures which have resulted in the disintergration of the structure — the joints being, in many places, open, and in others compressed to such an extent that the stone has splintered, and is full of cracks.

All of which is respectfully submitted.

(Signed) John Bogart,
Thomas C. Clarke,
Richard M. Upjohn.

April 16, 1888.

A VENETIAN SHIP-RAILWAY.[1]


FROM THE CHURCH OF SAINT-DENIS AFTER DECORATION

This paper is an abstract from a volume entitled "*Venice and the Venetians*," by Marsh. The story is now told as bearing upon the question of surmounting the American isthmus by similar means. The character of the two engineers, one the executor of the Venetian ship-railway project and the other the projector of a much more important and permanent work of this kind, are in many respects similar. Both were men of bold projects, of carefulness of details, and of entire confidence in their plans, and it is not too much to say that the engineer of the modern ship-railway, had he lived, would have as surely seen the success of his project as Sorbolo witnessed the success of his bold undertaking. . . .

The recent occupation of the city of Brescia has called renewed attention to this stronghold, which has figured extensively for many centuries in the predatory wars of the Italian States. It is an inland Gibraltar, the key of a highly-productive territory, stretching from the foot of the Lombardian Alps and commanding an extensive commerce, the Lake Garda, only a few miles distant, being the western boundary of Venetia. Brescia is built upon the summit of an extensive hill, surrounded by three successive walls, between each of which there are vast plains sufficient for the encampment of an army and for the maintenance of herds of cattle and sheep in case of siege, and from the centre of the city towers the ancient citadel, commanding every acre of ground within the walls. It is in every respect a remarkable place, but in nothing more so than in the fact that something like four and a half centuries ago, during one of its memorable sieges, it was relieved by a novel expedition sent overland by the Venetians. Immense galleys, fully manned and armed with the ponderous stone-throwing artillery of the period, were safely conveyed from the waters of the Adriatic over the plains and mountains of Italy to the Lake Garda, to do doughty warfare upon the besieging enemies of Brescia riding quietly at anchor upon the waters of the lake.

The garrison and the people of Brescia had been reduced to the direst extremities and the Milanese were in possession of all the approaches. The best engineers of Venice had discussed for many days, in the presence of the Senate, a variety of modes for effecting the desired object, and the one ultimately adopted was a scheme so bold and novel at the time as to surpass everything that had been before attempted. Of course it met with the loud execrations and ridicule of all the experienced engineers of Venice. But the man who suggested it was equal to the occasion and knew his ground. He had spent many years in superintending engineering works of considerable magnitude in the Venetian territory and had also had some experience as a soldier and knew how to handle troops. He requested that he might have an interview with the Doge and the Council, and his request was granted. He boldly stated that he was prepared to submit a plan which would afford the necessary relief to the beleaguered city. The Doge and the Council looked upon him with incredulity, wondering what fresh proposal could possibly be made by one so little known. They saw before them a man short of stature, with restless eyes and black hair, cut short about his ears, with a voice almost effeminate, but who certainly made up for his insignificant appearance by the boldness of his proposal. At a signal from the Doge, Sorbolo commenced his speech.

"Most Serene Prince," said he, "I have come to unfold a plan which I have conceived, whereby you may afford the necessary relief to the most noble city of Brescia, by placing a flotilla of ships upon the Lake Garda. It is well known that the passage by the Mincio is closed, owing to the treachery of the Duke of Mantua. Therefore, there only remains the Adige available for the purpose which I am about to submit to this reverend Assembly. I know the stream as well as I know the Grand Canal. In winter it is swollen by the rains from the mountains, and is deep enough for the passage of the largest galley. I therefore humbly suggest that up this river a fleet of ships should be sent to a point fifty miles distant from the Gulf of Venice. From thence there is a long, level country, across which it were a very easy task to carry the largest-sized ships, provided men and oxen were furnished. The chief difficulty which will beset the path is presented by the mountain of Peneda, which rises abruptly to a considerable height from the shores of a small lake

[1] Portions of a paper by E. L. Cortbell, read before the Engineers' Club of Philadelphia, and published with the Proceedings of the Society.

through which I propose to pass. But this will not present an insurmountable difficulty. Having crossed the mountain, the Lake Garda is only twelve miles distant."

The venerable Doge and the august members of the Council listened in profound silence to the proposition. At first the thought occurred that the proposer must be mad, but on finishing his statement, he drew forth from a small box which he had brought with him the model of a galley, and before the view of the whole assembly, placed it upon a cradle of the kind he proposed to construct, on which to transport it overland. The plan was so simple that the doubts of the members of the College were entirely and at once swept away. The keel of the ship was fastened upon a small platform furnished with wheels, and from the projecting sides of the vessel there dropped pieces of wood, which were fastened to other pieces fixed at right angles in the frame-work of the keel. Where these two pieces of timber joined to each other wheels were placed, so that the whole mass could, by the appliance of sufficient power, be drawn along the ground.

Sorbolo was dismissed with compliments by the Doge and the whole matter was afterward laid before the Grand Council, by whom it was ultimately adopted, and the necessary instructions given for the preparation of a fleet suitable for the enterprise. The mode of conveyance was kept a profound secret, and no soldier knew the plan until fifty miles from the coast Sorbolo first put it in use. The Senate had given instructions for the preparation of six galleys, two of which were first-rate ships and the remaining four second-rate. In addition to these were twenty-five light barques, forming a most useful flotilla for the purpose designed. The galleys were fitted with all the appliances necessary for a naval combat — with heavy cannon, with stone balls, with large stores of cross-bows, arrows, lances and all the usual munitions of the period necessary for conflict with the enemy.

The command of the fleet and armament was given to Pietro Zeno, and it sailed from Venice in the middle of December, 1438. On reaching the mouth of the Adige, ample water was found to float the vessels, but the current was so strong that it was necessary not only to make use of the sails and rowers, but also of men with ropes to assist in drawing the vessels against the stream. This portion of the journey consumed one-half the time occupied in reaching the lake, and at the end of six weeks only fifty miles of water had been traversed.

Then began the labor of transporting the ships across the land. The soldiers and mariners were astounded when they were informed by Zeno and their captains that the ships were to be transported overland. They were incredulous, but Sorbolo's measures were complete. While the platforms with wheels which they had brought from Venice were being put together, a channel was dug in the bed of the river, in which the frame-work was placed, and then the galleys were towed, one after the other, on their new cradles, and oxen attached to them drew them without difficulty to the level ground. Sorbolo had dispatched agents beforehand, and when the expedition arrived at the point chosen for the overland route, they found the fields filled with oxen which had been brought for the use of the Republic. It required the united strength of six hundred oxen to draw each galley out of the water, but when they were fairly landed and on their ways, the largest of them were moved with ease by three hundred, and under the direction of the peasants who came with them, the oxen did their work in splendid style. Galley after galley was drawn from the river to the plain, and when the six largest ships stood in a row, the appearance which they presented was most curious. Their masts towered far above the tops of the trees in their vicinity, and their huge hulks, bolstered high and dry upon the land, were objects of astonishment and curiosity to all who beheld them. The ground for nearly thirty miles of the remaining fifty was quite level, and a hard frost had turned the fields into roads over which the ships passed without difficulty. . . .

Nearly three thousand oxen were engaged in drawing the vessels, and of these one thousand eight hundred were attached to the six largest galleys. The barques, mounted upon small wooden carriages of great strength, fitted with substantial rollers, gave very little trouble. The fields were covered with snow and a sharp frost prevailed, but the air was calm and the active operations in which the men were engaged kept them in excellent health and spirits.

The first day passed without the slightest mischance. In the evening, at sunset, a halt was called, and the preparations made for a substantial meal before resting for the night. Then Zeno, in the name of the captains, congratulated Sorbolo upon the complete success with which his plans were working. Day after day passed in the same way, without accident of any kind. The passage of the ships caused the greatest excitement among the peasants, who were profoundly impressed with the appearance of the great hulks moving over their fields with as much ease as if they had been a string of carts. In the daytime the creaking of the wheels, as they revolved over the frozen surface of the ground, was the only noise caused by progress of the expedition, and at night the numberless lights and camp-fires and the occasional tread of the sentinels and patrols were the only noises to be heard. There was no shouting, no hurrying to and fro, such as usually attends the movements of large bodies of men. All this had been provided for and the quiet of a well-disciplined camp observed throughout.

So long as the level ground lay before them all went well, but after crossing the small lake which Sorbolo had spoken of to the Doge and his counselors, and the almost perpendicular sides of Mount Peneda presented themselves, the soldiers looked upon the impediment with consternation, if not dismay. To drag the ships up such a place appeared to them a task of ridiculous absurdity. But Sorbolo's plans had compassed every difficulty. They anchored the fleet at a point where a little mountain-stream, like a silver thread, ran in a narrow gully to the lake. The bed of this gully was so small that only two men could walk abreast in it. The path was also obstructed by the growth of lofty pines and the mountain sides were thickly covered with giant trees. Sorbolo laughed when he saw the blank looks on the countenances of the men.

Peasants from the surrounding country had been summoned in large numbers with pick-axes and spades. They were separated into detachments and worked together with the soldiers and mariners, under the direction of captains selected for the task by Zeno and Sorbolo. In the first place, the base of the mountain had to be levelled because it rose precipitately from the ground. Then the bed of the mountain-torrent had to be widened, and finally the galleys and the barques had to be drawn up the causeway so constructed. No portion of this work daunted the men as soon as they comprehended the plans of their leaders. Hundreds of men with pick-axes soon dislodged the broken ground on the mountain sides in sufficient quantity to fill up the space between the base of the rock and the shore with a sloping causeway, while hundreds of others were employed cutting down the trees in the bed of the little stream and from the sides of the mountain in sufficient quantity to form a continuous causeway one mile in length to the summit of Peneda. All these several operations were accomplished, and after the lapse of a few days, preparations were finally made for the experiment. The levels of the roadway were pronounced perfect, and then, by direction of Sorbolo, earth was strewn upon the fallen trees and snow was shovelled upon it, which, freezing in the night, consolidated the foundation over which it was designed the ships should pass. The oxen were of no use in this work and they were driven around the small lake and up the mountain-paths to the summit, there to await the arrival of the ships. In place of them a large number of windlasses were fixed at regular distances from each other on each side of the roadway. By a proper distribution of the men in the transit of each vessel, the journey up the mountain was performed without any accident. The ropes which were attached to the windlasses and the ships were made for the purpose, under the direction of Sorbolo, in the rope-walks of the Arsenal. As each vessel, mounted upon its carriage, started up the incline, six windlasses were brought to bear at a time, and as the vessel moved upward, foot by foot, it was carefully wedged so that it could not by any mischance slip back again. Then, when each set of windlasses had performed their work, the ropes were carried on and attached to a fresh set of windlasses in advance. . . .

When the first galley appeared upon the crown of Mount Peneda, the men could not resist a hearty shout of triumph, which was echoed again and again by the sharp rocks, until it died away in a whisper upon the face of the lake below. The course of action pursued by the whole was the same. The small barques gave the men little trouble, and when the whole was finished and the fleet rested triumphantly upon the crest of the mountain, the oxen took their places again and the ships were moved majestically to the mountain-side, from whence the soldiers, sailors and peasants could see plainly far below them the clear waters of the lake. Never before or since had such a feat been accomplished, and for the first time in the world's history a fleet of war ships had ascended to the summit of a mountain. The spot chosen for the descent was one where the granite rock had been in antediluvian ages polished by the passage of icebergs down into the lake below; but in the course of ages masses of granite falling from above had broken the face of the decline, and Sorbolo found it necessary to bring his peasants and soldiers upon the scene, with their pick-axes and spades, in order to make a level road to the ground below. The face of the rock was so precipitous that the workmen found no track or path upon which even a goat could stand. But the work was accomplished in due time — masses of loose granite were dislodged and hurled below, trees were cut down and earth was shoveled upon them, as in the ascent. When all was ready the ships were carefully placed upon the causeway, but the work which the windlass men had now to perform was exactly the reverse of what it was on the other side of the mountain; for whereas it was by their efforts previously that the great ships were drawn up the steeps, now it required their utmost skill to prevent the huge weights from being precipitated to the bottom. But Sorbolo had fitted the windlasses with an appliance which greatly assisted the men. The wheels were taken from under the galleys, and as soon as the wedges were removed and the brakes applied to the windlasses, each ship moved steadily downward, slowly and majestically descending the steep incline, until at the foot of the mountain it glided quietly upon the rollers placed to receive it, and the oxen proceeded with it as before, about twelve miles to the border of the lake.

The abrupt descent was the only portion of the journey attended with misfortune; one ship, overbearing the windlasses, obtained such a momentum as to snap all the ropes asunder, and dashing madly from side to side, fell to pieces on the ground at the bottom. With this exception, the whole flotilla traversed the land and crossed the mountain in safety; and in February, 1439, every ship floated in peaceful triumph in the harbor of Torbolo, on the northeast corner

of the lake, three months only having been consumed in the journey. Zeno now took command, and in order that he might complete his arrangements for a conflict with the enemy, he ordered the haven to be strongly defended by piles, so as to prevent a surprise.

Several weeks elapsed before the Milanese discovered the presence of the Venetian ships. A light barque which had been dispatched from the opposite side of the lake to reconnoitre, first saw the flotilla. The men on the little vessel, when they saw the towering sides of the great galleys floating in the harbor of Torbolo, could not believe their own senses. They fancied at first that they beheld a mirage of the Milanese fleet which they had just left, and therefore sailed straight on until they came to the mouth of the haven and found it effectually blocked with piles, from which they could distinctly see the Venetian soldiers on the decks of the ships, and the flotilla of light barques anchored around. They were filled with astonishment and awe at what they supposed was a miraculous interposition of Providence, for they were convinced that to no human agency could such a phenomenon be attributed. The Milanese barque hastened back to the fleet and reported to the commanders, Vitaliano and Giovanni Gonzaga, the discovery they had made. The commanders considered the report incredible, but nevertheless ordered another barque to reconnoitre, and upon its return with a confirmation of the news, made immediate preparations to fit their vessels for battle. This, however, occupied many weeks, and in the meantime Zeno, having completed his arrangements, sent out his barques to reconnoitre. In the course of a few weeks more the barques of the opposing commanders met, and encounters took place which most frequently resulted in favor of the Venetians.

Meantime the arrival of a Venetian fleet upon the lake was communicated by spies to the citizens of Brescia. But the news was received with incredulity when the messenger declared that the fleet had crossed the mountain of Peneda, and the man was put into prison until the arrival of a succession of spies confirmed his story. Two serious obstacles, however, still presented themselves before any attempt could be made to relieve the city; one was the fleet of Gonzaga and the other the army of Piccinino, which was encamped between the lake and Brescia. But the presence of the Venetian fleet operated with great fear upon both commanders, and until it was removed very little progress could be made by either the Milanese fleet or army.

The condition of Brescia was at this time very serious. The food which they had was becoming exhausted, and scanty supplies only could be obtained from the surrounding country, owing to the presence of the enemy. Still every week a certain quantity of fresh food was obtained, and this, combined with the presence of the Venetians in their immediate vicinity, sustained the hopes of the besieged. Dispatches announcing the success of the expedition across the country to the lake were duly received in Venice, and in the beginning of spring preparations were made for the renewal of the conflict on land. . . . The reduction of the fortress of Tenna, then in the possession of the Milanese, was absolutely necessary, and while the army was making the approaches necessary to its investment, the flotilla under Zeno was holding the Milanese in check upon Lake Garda. On the 26th of September he determined to give them battle, and leaving his anchorage at Torbolo, was soon surrounded by the superior forces under Gonzaga and his fleet utterly destroyed. During the conflict, however, hundreds of the Venetians escaped to the shore, and under cover of the darkness succeeded in penetrating to the city of Brescia, taking with them a portion of the stores which they had brought with them.

The captured ships were burnt by the Milanese, and thus perished that fleet which had performed a journey unparalleled in the history of the world. The news of the disaster was carried to Venice by Sorbolo and others, and the Senate gave immediate orders for the preparation of another fleet to take its place, which Sorbolo had undertaken a second time to carry across the country and over Peneda to the lake. But the successes of Sforza's troops rendered the immediate repetition of the feat unnecessary. . . .

Meantime Sorbolo had been busy at Venice, and early in the spring of 1440 the Venetians managed to dispatch another fleet, larger and more powerful than the first, to the Lake Garda, under the command of Stefano Contarini. He opened the campaign in April by destroying the fleet of the Milanese, and in the month of June Sforza utterly crushed the army under Piccinino; and Brescia, after sustaining a siege of three years, was permanently relieved.

But it is not the military or strategic success which finally attended these engineering operations of Sorbolo, but the operations themselves, to which we invite attention — the fact that more than four hundred years ago two formidable fleets, fitted out by the leading maritime power of the day, loaded with a complete armament for active aggressive operations, were successively carried over land and over a formidable mountain barrier, some ninety miles from the waters of the Adriatic to the Lake Garda. Nor was this accomplished by the aid of any of our modern appliances — there was no carefully graded railway, securely ballasted and bridged, provided with rails of steel and skilfully constructed locomotives. The means at hand were cordage and windlasses, oxen and manual force alone, and the roadway the most primitive imaginable.

It will be seen from the consul's letter that some of the vessels transported overland were of no inconsiderable size. The displacement of the largest class, as near as can be estimated, was over 300 tons, or a gross register of 175 tons. They were manned by at least 150 sailors, with probably a contingent on board of at least 150 marines.

THE TURKISH BATH: ITS DESIGN AND CONSTRUCTION.[1]

THE features peculiar to the bath are those requiring careful consideration. It is upon the design of the hot-rooms, the cooling-rooms, and the washing-rooms that the success or non-success of a new bathing establishment depends, and too much study cannot be given to these apartments.

THE SUDORIFIC CHAMBERS.

These are now generally required in a suite of three — "1st, 2d, and 3d Hot." The first is the tepidarium, and must be by far the largest of the three, since in it the greater number of bathers will assemble at one time. The last must be the hottest room — the laconicum — and need only be a very small one, as but few bathers use it, and that, generally, for a very short time. The second hot-room should be about midway in size, and the temperature between the first and the third. Of a given area allotted to the hot-rooms, from one-half to two-thirds may be devoted to the tepidarium, and from one-half to one-third to the super-heated rooms, always remembering that it is well to err on the side of providing a large and roomy tepidarium. Of the space allowed for the smaller rooms, one-third to one-quarter may be given to the hottest, and the remaining space to the 2d hot-room, or calidarium.

The hot-rooms, it should be remembered, are strictly bath-rooms, and must be treated as such; that is to say, the whole of the floors, walls, ceilings, partitions, and fittings, must be capable of being frequently cleansed with water. The choice of materials to be employed for lining the walls, etc., is therefore limited. And in two ways. For not only must they be of this washable nature, but they must be of a character to resist the influence of the heat. Happily, this is an age of glazed-ware and virtrified goods of every description. Glazed and fire-burnt bricks and tiles, terra-cottas, faïence, and pottery generally are now so extensively manufactured that there is little excuse for not constructing a bath throughout of materials at once washable and unaffected by high temperatures. Still, in baths where rigid economy must be studied, and lowness of cost is the great object, *plaster* may be placed upon the walls of the hot-rooms, and in its way will answer admirably, and be fairly washable. It has even one advantage — it does not become unbearably hot to the touch should the bather lean against the walls, whereas, with a highly glazed surface the walls become burning hot, and need lining with a dado of felt or other non-conducting substance. But since this latter method overcomes the objection named, the best possible material for lining the walls is glazed brickwork. In cases where elaboration is aimed at, they may be lined with marbles and faïence. With a judicious selections of colors, however, a very pleasing appearance can be given by the employment of simple glazed brickwork, and at a very moderate cost. The less heated rooms, again, may be lined with glass in panels arranged in stiles and rails of wood affixed to the rough brickwork.

The flooring in cheap baths is admirably formed by simple unglazed tile pavement over concrete. A slight roughness is very agreeable to the feet. Glazed tiles are inadmissible, as they become too hot for the naked feet; and if the slightest moisture come upon them they are rendered dangerously slippery. In elaborate baths, marble and marble mosaics may be used, but the surface must not be too smooth. In providing floorings the greatest care should be taken to avoid anything liable to become slippery to the tread.

The ceilings, of the fire and heat proof floors which, when there are other apartments above *must* be provided over the hot-rooms, may be of plaster. But the heat at the ceiling level is very great, and the plaster here rapidly darkens and blackens, and in this state looks anything but attractive in a place where the mere suspicion of uncleanliness is nauseating. If employed (and this remark also applies to plaster on walls), it should be used in the simplest manner possible, without the slightest attempt at modelling the surface. Glass may be employed for ceilings in the same way as for walls, as also may enamelled iron. The best method of ceiling would be by vaults, but is an unpracticable one, as floors of iron and concrete are generally adopted. The little laconicum, however, is best covered

[1] A paper by R. Owen Allsop, published in *Building News.*

with a flat arch, the soffit being of glazed bricks, and the springing being brought down below the main ceiling level.

When the hot rooms are in a basement in the open, they may be top-lighted, and the ceiling above need not be a heavy fireproof construction. A sufficient air-space, however, must be provided between the ceiling and roof, to prevent irradiation of heat — a remark that applies also to anything in the shape of a window to the sudatorium. They must be double or look into an area covered with pavement lights. In the case of a top-lighted room there must be a ceiling-light and a sky-light.

Where the hot rooms are constructed quite above ground, consideration must be given to prevention of loss of heat from radiation. This may be effected by providing thick hollow walls, the cavity being usefully employed for the extraction of the vitiated air.

The space allotted to the sudatory chambers may be divided into the various rooms, either by solid brickwork or by framed and glazed partitions; or again, they may be formed by a combination of solid brickwork and glazed woodwork. Any piers in these rooms must be of brickwork, iron columns being inadmissible. Masonry, too, must be discarded throughout, or used with caution. Some stones — such as red Mansfield — become black with exposure to the heat, and others fare still worse. The employment of porous and absorbent materials of any sort must be guarded against throughout this portion of the bath, as it should be remembered that effete matters, particles of waste tissue, and possibly the germs of disease, are continually being given off by the perspiring bathers, and must be prevented from finding a lodgment.

The best woods for use in the hot-rooms are close-grained and free from essential oils. Mahogany is excellently adapted for the purpose. If price were not preventive teak would be the best. Pitch pine must be discarded altogether. Deal, when employed, should be perfectly seasoned, and may then give trouble from the exudation of turpentine.

The partitions, and the doorways in them, must be placed to govern the flow of hot air. So long as the main divisions be planned with this aim in view, the separate rooms may be divided and broken up as the architect may fancy. But the constant flow of the heated air from the so-called "radiating chamber" in the hottest rooms towards the lavatorium must not be interfered with by recesses, nooks and corners, or anything that would cause the current to stagnate. And here we may see the practical advantage possessed by a bath where the hot rooms are *en suite*, and in a line with one axis. For here the air sweeps uninterruptedly through the different chambers without eddying around corners and stagnating in recesses far out of the main stream.

The doorways in the partitions should be lofty. They should not be hung with doors, as anything necessary in this way will be amply supplied by depending curtains.

No provision for draining the hot rooms is necessary, as they must, when in use, be kept free from moisture. The floors may, however, if thought desirable, be laid with an imperceptible fall the way the water would be swept when cleansing, viz., towards the lavatorium.

As the best position for a bather to assume in the sudatorium is the horizontal, a bath cannot be considered complete unless a liberal number of marble-slabbed benches be provided. These should run round the solid walls, the risers of the benches being formed of brickwork, glazed, faced with tiles, or plastered, and white marble slabs set thereon. These slabs cannot be less than 24 in. wide, and must be of the ordinary seat height — not lower. In the risers must be provided a liberal number of "hit-and-miss" ventilator gratings, the vitiated air finding its way from the space beneath the slabs in the way allowed for, which may be into surrounding areas, into hollow walls, or into flues running the whole height of the buildings.

The air at the floor line and that at the ceiling level being of vastly different temperatures, it follows that an arrangement might be designed whereby the benches might be stepped in three or four rows, and, by ascending, the bather could select any temperature he might choose. Such an arrangement was often designed in the baths of the ancient Romans, and has been tried in modern institutions; but it should be avoided. The expirations from the lungs and the exudations from the bodies of the bathers *fall*, and it therefore follows that all below the first tier would be breathing air polluted by those above them. The system, therefore, stands condemned.

As regards height, the sudorific chambers should not be too lofty, or they cannot, on the modern plan, be heated with due economy. The vastness of the old Roman tepidarium would have been impracticable under our system; but with the heat radiating direct from the walls and the floors there was no difficulty. It is better to have a comparatively low chamber with a constant stream of freshly-heated air passing through it than a lofty one with a sluggish current. From 10 to 15 or 16 ft. may be taken as moderate extremes of height in a commercial bath. The small third hot room will be less lofty if as is ordinary and most convenient, the heating-chamber be placed under it. For by raising the floor of the laconicum a few feet so as to necessitate ascending to it by a few steps from the level of the tepidarum, one can more economically construct the furnace-chamber.

This latter should be so placed that an abundant supply of fresh pure cold air can be obtained from the furnace, which, when heated, can be delivered into the hottest room above, not less than 5 ft. from the level of the floor of that chamber, and, also, where a smoke-flue of ample section can be constructed. The heated air may be delivered through gratings in the walls of the laconicum, or a shaft of rectangular section of glazed brickwork may be constructed against the end wall and coped at the required level, 5 ft. or more above the floor line. Should the exigencies of the site separate the furnace-chamber from the immediate connection with the hottest room, the heated air must be conducted from the former to the latter by means of a large shaft or shafts of glazed brickwork. Similar means may have to be employed to bring the cold air to the heating-chamber, and at the mouth of this shaft some provision must be made for filtering the air before it is brought into contact with the heating-surfaces of the furnace.

BOOKS & PAPERS.

GUILLAUME-SULPICE CHEVALLIER was essentially a Paris *gamin*. Entering upon life on the 21st Nivôse, an XII (13th January, 1804) in the gloomy, smutty house of a coppersmith in the Rue des Vieilles-Handriettes, he seems to have passed his life, and pursued his art in the manner unto which he was born. His father had served as a national guard during the Revolution; his mother was the sister of G. Thiémet, who was both an actor in the buffoonery line of business and a caricaturist — the author of "*Les Moines Gourmands*." When a mere boy, Gavarni was placed with an architect named Dutillard; but all he seems to have learned was to scribble a little as so many artists have done in their youth, without showing any particular talent. Later on he went to a small school in the Rue de Clichy, where he learned a little arithmetic. At thirteen he entered the shop of an instrument-maker, and at sixteen or seventeen he studied mechanical drawing at the school of the Conservatoire des Arts et Métiers. Of positive artistic training this was all, and cannot be called much; but during all his youth he was laying up a store of knowledge, which later on he was able to turn to good account. With little or no money, he ran about the streets, a mere vagabond; seeing everything and noting everything; and so upon entering on manhood, he was possessed of quick observation, good health, a desire to succeed, a perfect knowledge of the worst side of Parisian life and an uncontrollable love of pleasure — this was the mainspring of his life. Not desiring, or not being able to make his parents pay for his dissipations, he began to work with a will, knocking off little drawings for which he received a few sous. A lucky chance sent him to Bordeaux to make some drawings for one of his patrons, for which he was to receive 1,200 francs a year; but arriving in the South, and discovering the work to be uncongenial to him, he quarrelled with his employer and found himself without friends or money. Here, again, his vagabond spirit served its master; for, wandering about, apparently without purpose, he arrived at Tarbes, with only two shirts and forty-two sous, to find a friend in M. Leleu, the Public Registrar of the Department, who, taking a fancy to him, offered him board and lodging. A fac-simile of a drawing by Gavarni of his room at Tarbes is given by the author, which shows that love and care for detail which may be found in pre-Raphaelite work. For two years the caricaturist seems to have amused himself by running about the South, joining on to the circus of Gavarnie (from which he took his *nom de brosse*) and otherwise vagabondizing; always promising his parents to return. However, once in Paris, he, always putting off the day, established himself in a studio and set to work upon various series of drawings, such as the "Cris de Paris" and the "Costumes des Pyrénées," besides four little water-colors of no merit whatever. In 1830 Gavarni was fortunate enough to meet with de Girardin, who invited him to illustrate his journal *La Mode;* and it was in the office of that paper that he met many of his later friends, Balzac, Eugéne Suë and other literary celebrities of the day. Balzac asked him to illustrate his "*Peau de Chagrin;*" but it was mainly as a satirist of the dandyism of the day that the success of Gavarni was greatest. It is curious to find this *gamin* who was given to all the *sans gene* of low Parisian artistic life, who filled his letters to his friends with cutting remarks about the *ennui* that the respectables caused him, gaining a reputation by his perfectly-clad men of fashion, and his *femmes à la mode* full of coquetry and *chic*. He was a sort of Worth *au crayon*, designing dresses for women of the world, and arranging colors and costumes for Déjazet and Mme. Georges.

In 1832 Gavarni was a success, working for the *Musée des Familles*, *l'Artiste*, and a little later for the *Charivari*. Unfortunately, he was ambitious to shine as a literary man, and after publishing one or two poor specimens of fiction, he launched the *Journal des gens du Monde;* but in spite of the collaboration of such men as Charlet, De Vigny, the Johannots and Dumas, it struggled through only six months of existence and nineteen numbers, leaving its parent with a deficiency of 25,000 francs, and not a sou to pay the debts. Then came the dismal journeys to the *mont-de-piété*, the humiliating interviews with creditors, and, finally, a lodging in the Clichy goal for debtors. All this mixed up and intermingled with various kinds of dissipations, which M. Forgues excuses on the plea that Gavarni was a "true artist," and that his immoralities were simply a part of his æsthetic feeling which prevented him, in

1 "*Gavarni*," par M. Eugéne Forgues. Librarie de l'Art, Rouam: Cité d'Anton, Paris.

company with the great army of artists, from acting like an ordinary, honest, moral human being.

In 1844 Gavarni married Jeanne de Bonabry, who was a clever musician; but neither her beauty nor her talents prevented the husband from wearying himself in his new position, married life was too prosaic for him — he liked change in all things; and so, after three years of her society, more or less interrupted, he set off for England, and so rid himself of his self-imposed restraints. M. Forgues is eloquent upon Gavarni's failure in pleasing the London fashionables; they were too reserved or phlegmatic, too full of *le cant officiel* to appreciate the artist, and he relates an anecdote which seems a witness to Gavarni's ill-manners more than to British "cant." Having accepted the commission to do a portrait of the Queen, he failed to appear, and did not even send a word of excuse or apology. M. Forgues's comment upon this specimen of ill-breeding deserves to be given in full. "*De pareilles façons expliquent suffisamment l'antipathie qu'éveilla longtemps le seul nom de Gavarni en Angleterre, et les protestations peu intelligentes qui accueillirent ses succès à son retour en France.*" After his return to Paris, Gavarni began to travel the downward path — always in pecuniary trouble, disgusted with his art, semi-maniac, passing his time mostly in his garden at Auteuil (his last passion) with his two boys. In 1852, he was offered the cross of the *légion de honneur*, and there is something exceedingly touching in his comments upon what came too late to be appreciated: "*J'ai désiré très vivement la croix quand je portais des habits, mais maintenant. . . . Et d'un coup d'œil il désignait la blouse bleue dont il s'afflublait dans son jardin.*" In his last years Gavarni seems to have lost his philosophy, and worried by debts, he shut himself away from the world, eternally changing the face of his garden, forming banks and cascades, but never finishing it. In 1862, the circular railway appropriated this, his last love, and he was obliged to move in spite of the intervention of the Princess Matilde with Louis Napoléon. He died soon after this misfortune, almost forgotten amidst the political troubles and passions, which, towards the end of the Emperor's reign, were stirring the French nation.

Gavarni was not only a draughtsman, but his work was generally supplemented by his text; and perhaps one of the best of his drawings is the impudent street arab with his hands in his pockets and his head tossed up: "*Si mon pince-nez m'empêche de voir, ça ne regarde personne!*" Many of his drawings are grotesque, but without the humor of Jacques Callot, or the satire of Hogarth. Gavarni painted the disreputable side of human nature in the manner of Zola — witness his two figures "*Le gin;*" his rollicking "*Jalouret, vous êtes un polisson!*" and "*Mon épouse, serait elle légère?*" which are repulsively humorous, but are certainly not moral satires. Gavarni does not teach, as Hogarth does, the results of depravity. But for dexterity and facility with pen, pencil, and brush, there is no one perhaps his equal. What Daumier did for the law, Gavarni did for Parisian low-life; but whether a caricaturist of this nature will survive our generation is questionable. Hogarth lives and will live in spite of his satires being out of date; but Hogarth was above all things a fine painter. Whether his reputation would have survived until the present day, had it depended only upon his engravings, is a matter upon which there can scarcely be two opinions. On the other hand the reputation of Gavarni rests almost entirely upon his printed works, and many of these are now considerably out of date. Fashions, which are not old enough to be picturesque, are not particularly interesting.

It ought to be stated that the author of this life of Gavarni, is the son of the artist's great friend; which accounts for and excuses M. Forgues's somewhat excessive partiality for the clever caricaturist.

S. BEALE.

COMMUNICATIONS

CHANCES FOR THE MORALLY-INFIRM.

JOLIET, ILL.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — I enclose you three letters recently received which offer a commission to architects for whatever goods may be specified of these particular manufacturers. It occurs to me that the proper disposition of such letters addressed to any architect is to send them as once to a publication like the *American Architect*, who should publish the full text and the firms' names. By so doing they would readily meet the eyes of architects who desire to do business in that way and those that do not would as readily know what firms to avoid. This commission (or boodle) business of architects is entirely illegitimate and is at present the greatest standing shadow over the profession; the sooner it can be done away with the better for the profession at large, and I see no better way of doing it than mentioned above. Very truly yours, F. S. ALLEN.

CHICAGO, April, 23, 1888.

MR. F. S. ALLEN: —

Dear Sir, — We shall be pleased to figure on any Stained Glass you may have, and in consideration of its being less expense to solicit outside orders, I will offer you 10 per cent on all orders you may send us. We will submit designs and hope to receive your orders.

Yours truly, MAX SUEZZ, *Manager.*

CHICAGO, April 24, 1888.

F. S. ALLEN, ESQ: —

Dear Sir, — Will you kindly examine our circulars, and on any Counter you may cause to be sold we will allow ten per cent on selling price. Our counters are better finished than anything on the market at present, as this work is done before the counter is put together, and by a special process of our own invention. The counter ships at almost lumber rates, while a bright boy can set it up. Where we have put this counter it has pleased every one, whether owner or customer at store. It is neat and cleans perfectly with a duster as there is not a point where dust can collect. We make this in hard wood at $1.75 to $3.50 per running foot as per circular measure. On Store Stools will allow 20 per cent from list except on No. 1, which will be ten per cent; however, we do not suppose you will recomend the poorest on the list. These "Noiseless Stools" have displaced others in many instances, owing to this desirable feature. We enclose a postal, trespassing on good nature to request a brief reply to our lines.

Yours very truly, DUNLAP & CO.

UTICA, N. Y., May 5, 1888.

MR. F. S. ALLEN: —

Dear Sir, — We mail you to-day under separate cover our new complete illustrated catalogue for 1888. After an examination of the many superior points and merits of the Carton Warm Air Furnace, you think you can conscientiously specify the same in your specifications for new dwellings and buildings, we would feel well disposed to compensate you for your labors in our behalf. We hope this request may receive your attention, and that we may have the pleasure of hearing from you in relation to the same.

Yours respectfully, Carton Furnace Co.,
E. A. CARTON, *Sec. & Treas.*

A CORRECTION.

LONDON, ENG., May 25, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — Will you let me correct a misprint on page 222 in my "Paris Churches"? The curious ceremony of the *pain bénit*, is made more so, by the statement that "the donor is presented with a *pat and a kiss*," which ought to read, "a *pax* to kiss."

Yours faithfully, S. BEALE.

TO CURE A DOOR IN WIND.

PHILADELPHIA, May 25, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — Can any of your readers suggest, or inform me if they are cognizant of any method by which a twisted door can be made straight? In considering an answer to the above query I apprehended that correspondents will conjecture the kind and situation of the doors. The doors I have in mind when asking the question are veneered with the same kind of wood upon both sides, and have since first they were hung been subject to the same temperature upon each side, if there is such a thing as the possible straightening of a door out of "wind" I have no doubt it will interest a great many of your readers to know of it. ARCHITECT.

[A DOOR may often be taken out of wind, temporarily at least, by clamping in a frame and allowing it to remain for a time. — EDS. AMERICAN ARCHITECT.]

NOTES AND CLIPPINGS

BRITISH INTEREST IN OUR STRIKES. — According to a report from the British Minister at Washington, which has just been laid before Parliament, since the beginning of 1887 there have been 1,000 strikes in the United States, and of the 400,000 men engaged in them 25,000 to 50,000 are still out. The most serious was that of the New Jersey coal-handlers, which involved a loss in wages to those engaged of more than £500,000. The cost to the workers of the Pennsylvanian coke-workers' strike of the Spring, in which 13,000 men were engaged for 10 weeks, was about £200,000 in wages. More than two-thirds of the strikes between January and July, 1887, were fruitless and only brought loss and suffering to those engaged in them. As a whole, about 38 per cent., or more than a third of the strikers in 1887, succeeded in getting their demands, against 20 per cent in 1886. It is calculated that nearly 10,000,000 days' work and wages were lost. — *Pall Mall Gazette.*

DONE IN A MINUTE. — "Well, well, don't fret; I'll be there in a minute."

But, my friend, a minute means a good deal, notwithstanding you affect to hold it of no consequence. Did you ever stop to think what may happen in a minute? No. Well, while you are murdering a minute for yourself and one for me, before you get ready to sit down to the business we have in hand, I will amuse you by telling you some things that will happen meantime.

In a minute we shall be whirled around on the outside of the earth by its diurnal motion a distance of 13 miles. At the same time we shall have gone along with the earth, in its grand journey around the sun,

1,080 miles. Pretty quick travelling you say? Why, that is slow work compared with the rate of travel of that ray of light which just now reflected from that mirror made you wink. A minute ago that ray was 11,160,000 miles away.

In a minute, over all the world, about eighty new-born infants have each raised a wail of protest at the fates for thrusting existence upon them, while as many more human beings, weary with the struggle of life, have opened their lips to utter their last sigh.

In a minute the lowest sound your ear can catch has been made by 990 vibrations, while the highest tone reached you after making 2,228,000 vibrations.

In a minute an express train goes a mile and a Cleveland street-car 32 rods; the fastest trotting horse, 147 9-13 rods, and an average pedestrian of the genus homo has got over 16 rods.

In each minute in the United States, night and day, all the year round, twenty-four barrels of beer have to go down 12,096 throats, and 4,830 bushels of grain have come to bin.

If there were a box kept at the City Hall in the city of Cleveland into which every minute a sum sufficient to pay the interest on the city debt had to be dropped, the sum so dropped each minute of the whole year would be 87 cents.

How about national finances? Well, sir, in the same way, each minute, night and day, by the official reports for the year 1886, the United States collected $639 and spent $461; $178 more than necessary. The interest on the public debt was $96 a minute, or just exactly equal to the amount of silver mined in that time.

Now, in the residue of figures I give, you will remember that they represent so much for every minute in the year. All the preceding figures should be so considered. And remember, also, that we are all the time, hereafter talking about facts connected with the whole United States.

The telephone is used 595 times the telegraph 136 times. Of tobacco, 925 pounds are raised, and part of it has been used in making 6,673 cigars, and some more of it has gone up in the smoke of 2,292 cigarettes.

But I am afraid that you will forget that we are talking about a minute, sixty seconds of time. No? Well, then, every minute 600 pounds of wool grow in this country, and we have to dig sixty-one tons of anthracite coal and 300 tons of bituminous coal, while of pig iron we turn out twelve tons and of steel rails three tons.

In this minute you have kept me waiting, fifteen kegs of nails have been made, twelve bales of cotton from the fields, and thirty-six bushels of grain gone into 149 gallons of spirits, while $66 in gold should have been dug out of the earth. In the same time the United States mint turned out gold and silver coin to the value of $121, and forty-two acres of the public domain have been sold or given away. — *Cleveland Press.*

Ruskin's Guild of St. George. — The enthusiastic beginning and the rather sad decline of Ruskin's "Guild of St. George," which was to elevate manual labor and the taste of the British public in literature and art, is narrated by Philip G. Hubert, Jr, in the current number of *Lippincott's Magazine.* The idea of the guild was given in "*Fors Clavigera*" in 1874. A community was to be formed in which the work should be done with tools, — no machinery being permitted except for tasks beyond human strength. Museums of mineralogy and art were to be provided, and it was expected that they would serve as a refreshment to the laborer after his toil was done. Children were to be educated in bravery and beauty, and the birthdays of heroes were to be observed with morning and evening services. There was to be no rivalry, but each member of the guild bound himself to use his efforts "for the help, delight and honor of others." The guild started out with Ruskin as master and thirty-two "companions." It has at present not more than sixty members Land on which the experiment could be carried out was not obtained for several years, and when it was secured the plan did not work. As Mr. Hubert says: "Farm laborers who could grow good cabbages proved to be deaf to the teachings of poetry and art; poets who saw much in the simple primrose were too much taken up in its contemplation to find time for the cabbages." So part of the land is now used as a market garden, and other small tracts, obtained by gift at various times, are leased. The chief work of the members of the guild consists in collecting money and material for a little museum at Sheffield founded by the guild, and in the encouragement of hand-weaving and spinning and of handiwork of various kinds. The last report issued by Ruskin was made in January, 1886, and in it he shows much discouragement. The lack of support given his scheme he attributes to "the hard-heartedness incident to the pursuit of wealth," and says that "from the whole continent of America, which pirates all my books and disgraces me by base copies of the plates of them, I have never had a sixpence sent to help me in anything I wanted to do."— *Springfield Republican.*

A Long Tunnel. — A contract has been entered into between the Board of Direction of the Valley of Mexico and Mr. J. Gladwyn Jebb, representing the London-Mexican Prospecting and Finance Company, limited, for the execution of the work known as the Toquixquiac Tunnel. The work is to cost $2,350,000, covered by 7 per cent city bonds, issued at 82½ and running for at least ten years, the ultimate period of liquidation being fixed at thirty years. A sinking fund of 1 per cent. per annum on the total issue is provided for. The limit fixed for the completion of the work is two and a half years, counting from the date of the formal transfer of the tunnel to the company, but practically three years are allowed, as it is stated that each day over three years employed by the company on the work shall cause a fine of $300 to be deducted from the amount due the company on final liquidation. On the other hand, for each day less than two-and-a-half years saved by the company, a premium of $300 shall be awarded them. It is distinctly stipulated that the money raised by the emission of the bonds shall be devoted exclusively to the tunnel. The total length of the tunnel is 9.520 miles, of which there is already completed a trifle less than 1.000 miles. There are to be 23 shafts, of which 5 are already sunk. The tunnel will be brick-lined throughout, with an inner cement coating, and the stipulations of the tunnel contract call for first-class work. — *N. Y. Evening Post.*

TRADE SURVEYS

Manufacturers and builders are once again taking their trade bearings, with a view of arriving at some sort of an opinion as to the probabilities of the coming six months. The facts surrounding the market are as follows: Money is in abundant supply and the rate of interest low; investors feel about as much confidence in the general situation as they have done at any time this season: there are no indications of coming disaster; there is less apprehension now than at any time for months of any upsetting tariff legislation; financial questions will be left to take care of themselves, and as little legislation as possible will be enacted; all vexing issues will be left for the consideration of future Congresses. Manufacturers in a general way are restricting production, and fighting the downward tendency in prices as well as they can. Jobbers are distributing goods only to meet the actual market requirements, and are making no efforts to unload stocks as they did in former years, regardless of prices or the ability of purchasers to pay. The volume of "paper" is a little larger than it has been for some time, but has not reached dangerous proportions, and the greatest care is taken by merchants and manufacturers as to the extension of credits. Just at this time a good deal of apprehension is felt by investors and dealers in bonds and securities, lest railroad matters, which have been thus far kept pretty well in hand, for some reason, should become unruly. The troubles in the railroad situation, when reduced to our level, are these: There is a falling off in the volume of traffic and a consequent increase in the competition for traffic; the railroad war in the Northwest has not abated; Dominion lines are still monopolizing a good deal of the freight traffic; in fact, nearly all of the railroad companies between the Mississippi River and the Pacific, are as hastily as possible readjusting freight rates, lest the Inter-state Commerce Commission come down on them with heavy hands. One of the favorable features of the situation is the large amount of money that is anxiously awaiting investment, despite the fact that prices have been pointing downward, railway traffic diminishing, freights lower than a year ago, there is to-day, if the truth were known, more money awaiting investment than last year. This is not difficult to explain, from the fact that any one who has any knowledge of business, firmly believes that during the next twelve months, wide and more abundant opportunities will be opened for capital and enterprise than there have ever been. A great deal of money is seeking investment in Mexico and Central America; a few long-headed men are now engaged in schemes involving the outlay of a considerable capital in South America. A few months ago a good deal of apprehension was expressed over these lavish expenditures of the people's earnings, and the prediction was made that the outcome would be financial stringency; this prediction has proven false. There is as great a volume of money now in bank, if not greater; the surplus reserve in New York is larger, and everything goes to show that the opportunities for investment will be seized just as soon as the depressing influences which control the market at present shall have disappeared. Quite a number of prominent architects in the West have given it as their opinion that the present lull in activity will be followed by a healthful revival, although not of sufficient dimensions this season to make the volume of business up to that of last year. Plans are being made this year, which will, in their opinion, be carried out next year. Throughout the West all kinds of building material are in abundance and cheap. The demand for lumber in all Western markets is very heavy; prices have declined recently, and may drop a little more. The iron trade is in an unsettled condition, and competition in the crude product, between Alabama and Pennsylvania, is causing a great deal of disquietude. Consumers are profiting by it, and the producing interests themselves will be benefited by it in the long run. Steel-rails have dropped to $30 — the lowest point for two years — in the East. Large contracts cannot be had even at this price. There is a great deal of new mileage projected, and the probabilities are that when everything is rounded and evened up, there will be a steady, healthy demand for all kinds of mill and furnace products; but for the present iron and steel makers must be content with what they are able to do. The leading spirits in the iron trade, show their confidence in an ultimate satisfactory outcome, by projecting new furnaces and building additions to their mills. Several large steel-mills are under contract at this time; this can be accounted for on the grounds that steel is rapidly taking the place of iron for a large number of uses. As soon as railroad earnings show an improvement there will be large outlays for engines, cars, rails and track-supplies generally. The spirit of economy has seized the management of a good many systems; but it will not rule very long. A very interesting industrial feature of the present time, is the migration of the industries from one point to another where economy in manufacture and better traffic facilities can be secured. Northern industries are moving South; some Southern establishments are coming North; Eastern industries are going West to take advantage, in most cases, of natural-gas fuel; some Western concerns have come farther East. Glass-makers from all sections are flocking from old established centres to Ohio and Indiana, to use Natural gas. Large industries located in cities are moving into country places, and a variety of changes are being made, which show that the new forces which have come into play, viz., abundant and cheap fuel in new sections and new transportation facilities, are bringing about a readjustment and rearrangement. In addition to this, the host of little industries springing up in the far West, are creating new markets. This spreading of the industries into new fields, is illustrated by the fact that one of the largest steel-works in the country is being built near Chicago. Large casting and stove works are projected far West of the Mississippi. One of the largest blast-furnaces in the country is being erected at Duluth; flouring-mills are projected there, on a larger scale then even in Minneapolis. A multitude of machine-shops are going up along the lines of new railroads. A decentralization of industries is in progress, which will soon make the far West and South as thoroughly industrial in character as the New England and Middle States have been for thirty years past. This is a strengthening process. Our weakness in past decades was, that one section made iron; another produced coal; one grew cotton and another wheat. These conditions are changing rapidly; hereafter there will be no purely agricultural or cotton, or manufacturing section. The diversification in progress will result in an enormous multiplication of exchanges that will expand the need for commercial, financial, railroad, and all kinds of business and professional services.

S. J. Parkhill & Co., Printers, Boston.

THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. XXIII. Copyright, 1888, by TICKNOR & COMPANY, Boston, Mass. No. 651.

JUNE 16, 1888.

Entered at the Post-Office at Boston as second-class matter.

CONTENTS

THE *British Architect* entirely approves the measure now under consideration by the Illinois State Association of Architects, by which it is made an offence, to be punished by expulsion from the Association, for any member to allow draughtsmen in his office to do work as architects in their own name, either in or out of office hours. Although the adoption of this rule will seem rather harsh to a good many ambitious assistants, who entertain dreams of rising to sudden fortune through the winning of some great competition by designs made out of office hours, there can be, as it seems to us, no doubt that it would in the end be advantageous for assistants as well as architects. Mr. Wightwick, in his invaluable book, "*Hints to Young Architects*," lays down, as a maxim to be kept in mind by every young man employed in an architect's office, that "the better he serves his master, the better he will serve himself;" and this is true to an extent which even architects hardly realize. There are, or were in our day, certain draughtsmen who maintain a sort of chronic belligerency toward their employers in particular, and all employers of draughtsmen in general. These, when they can get an audience of assistants around them, indulge in long harangues about the injustice of those architects who object to having their draughtsmen do what they see fit out of office hours, and encourage the discontented ones to try to "better themselves" by surreptitious outside work. We have known cases where seed of this kind, falling on congenial ground, has blossomed into the purloining of quite a gallery of photographs of the master's work, to be reproduced at a small scale, and sent about, with the name of the enterprising draughtsman attached to them; or into a private arrangement between an unscrupulous client of the architect and an unprincipled draughtsman, by which an important commission was withdrawn from the office, on a flimsy pretext, and handed over to the draughtsman, who resigned his position just in time to carry out his former employer's design; but even where a young man shrinks from such gross rascality as this, he will often spend many hours, when he ought to be in bed, in pursuing some *ignis fatuus* of a competition, with no better result than unfitting him for his regular duties, and exposing him to the suspicion of his employer, who is sure to notice his lukewarm zeal in his service, and his languid, sleepy way of doing his work, and to mark him silently as the first to be discharged, if it should be necessary to reduce the office force. It must never be forgotten by draughtsmen who hope to advance in their profession that the way to make themselves valuable is to enter thoroughly and heartily into their employer's plans; to see that their own work goes on smoothly, quickly and with due regard to that of others; to remember that an hour's delay in the completion of their part of a set of drawings, or neglect to deliver them to the proper person when completed, is likely to cause serious loss and annoyance, and, so far as possible, to try to understand just how their master wishes the office work to be conducted, and then to do their part to have it move along in exactly this way, with the care and zeal which he would himself devote to it. This may seem like unreasonable faithfulness; but any architect will testify that the ability to carry on an office with smoothness and economy is the most profitable of all professional accomplishments. Without it, neither colossal genius, nor unlimited employment, will enable an architect to earn a comfortable living; with it, a small business will lead surely, though perhaps slowly, to fortune; and this accomplishment can only be acquired through the sort of practice in which a faithful head-draughtsman is trained.

AN extraordinary accident is reported to have occurred recently in London, and the attention of architects is publicly called to the dangers which follow from their well-known ignorance, carelessness and so on. It appears that an old gentleman was recently found dead in his bath-tub; and the inquest showed that death had resulted "from syncope due to the excessive heat of the bath-room, and the effect of the moist vapor which had accumulated in it." The coroner, in reporting upon the case, asserted that such occurrences are not rare. The moral which the *Lancet* draws from the circumstance is that architects are to blame for expending less study upon the proportions of bath-rooms than of their state apartments. A bath-room, it says, ought rather to exceed than fall below the capacity of seven hundred cubic feet which "hygiene recognizes as the minimum allowable for an inhabited room;" and "ventilators, with perhaps hoods, should always be provided to carry off the excess of vapor." It is rather surprising to find an Englishman ascribing to baths those fatal qualities which the imagination of the Polish Jew attributes to any method of applying water to the skin; but we must remember that in this case it is not the cold douche of the portable hat-tub which is referred to, but the warm bath, a much less familiar affair in England. As our readers know, the ordinary method of preparing for the enjoyment of one of these luxuries in England is to fill a tub with cold water, and attach a little lamp, and then wait quietly until the water is warmed to the taste. Most people's patience gives out long before the water is more than lukewarm, and in any case there is little danger of syncope from excessive heat or vapor likely to be generated by this contrivance; but it might possibly happen that an overfed old gentleman, meeting with some more powerful apparatus than usual, would go to sleep after setting it in operation, and wake to find himself surrounded by vapor. Under such circumstances the impulse of an American would be to extinguish the lamp, or turn off the hot water, as the case might be; but Englishmen seem to suffer a sort of paralysis in a warm atmosphere, and the only thing which the numerous victims of these accidents seem to think of is to lie down at once, and die in peace.

MR. E. DYCKERHOFF, a first-rate authority on the subject, has written in the *Deutsche Bauzeitung* a series of articles on cement and concrete, which are valuable, as containing the result of long and intelligent study and practice. So far as theory is concerned, Mr. Dyckerhoff's observations do not differ from those of other writers. To mix the matrix and the aggregate well together, so that every particle of sand or stone shall be completely surrounded by cement or mortar, is the essence of his, as of all other good methods of preparing concrete. For this purpose he employs, in making concrete for foundations, one part Portland cement, with six to eight parts sand, and six to eight parts screened pebbles, or eight to ten parts of broken stone. For walls, piers, and vaulted floors, or other constructions subject to a cross strain, one part cement is used to five or six parts sand, and five or six parts screenings, or seven to eight parts broken stone. It is hardly necessary to say that such concrete as this, containing less than half the usual proportion of cement, can only be made suitable for use by very careful and thorough mixing, and the principal lesson to be learned from Mr. Dyckerhoff's paper is, in fact, that care and skill in manipulation will generally take the place, with advantage, of at least half the cement in most processes where cement is employed. In determining whether six or eight parts of sand shall be used to one of cement, Mr. Dyckerhoff

leaves nothing to chance. Where the sand is of unknown quality, samples are mixed with varying doses of cements, and, after setting, tested both for tensile and crushing resistance, and the proportions found to be most suitable for that particular sand are rigidly followed. Nothing, as he says, can be told about the quality of sand from its appearance, provided, of course, that it is free from clay or loam; and samples of doubtful aspect will often give a concrete surpassing in strength that made from much brighter and better looking sand.

AFTER the best proportions of the materials are determined, they are maintained with a precision unknown to the practice of the average builder. The cement is never measured, for the reason that it settles more or less closely in the measure, according to the rapidity with which it is filled, and the actual quantity contained in a given volume will thus vary. Instead of this, a bag of cement, which always contains a certain weight, and thus a standard volume, is taken, and the requisite amount of sand and pebbles for mixing with this quantity of cement is then laid out by means of a measure, which, for these materials, gives sufficiently accurate results. The pebbles are piled separately, and the sand is spread out in a "pen" of clean close-jointed planks, and the cement spread over it. The whole is then thoroughly turned over, dry, three or four times, according to the character of the sand; and, after adding, in one dose, the necessary quantity of water, the mortar is turned three times more, forming a uniform, slightly damp mass. The pebbles or broken stones, which have meanwhile been well washed, and left a little moist, are then added, and the whole turned two or three times more, as may be necessary to coat all the stones completely with mortar. This point is regarded as of the utmost importance, and even during the transportation of the concrete to the place where it is to be used, the workmen are required to watch it, and push the stones that may be shaken to the surface by the jolting of the cart back again into the soft mass, before they have time to dry. On reaching their destination, the carts are unloaded as near as possible to the intended position of the concrete, which is then placed carefully in the trenches, by experienced workmen, in layers about eight inches deep, the men keeping always careful watch, to see that all the pebbles are completely surrounded by mortar; then strong laborers compress the layers with wooden rammers, shod with iron, until a film of water appears on the surface. In all cases, in Mr. Dyckerhoff's practice, the work is done by thoroughly experienced men, under the constant supervision of an expert, this care being, in his opinion, necessary to success.

WHERE the concrete is used for building above ground, it is generally necessary, after the walls are completed, to give them a finishing coat, to cover the roughnesses incidental to the first moulding. This is done with a mixture of one part Portland cement with two or two and one-half parts of sharp sand, to which is added, unless the sand contains fine particles, about one-tenth of a part of fat lime, in the form of whitewash, or thin "putty," in order to make the mortar work smoothly and easily. After thoroughly washing the concrete walls with water, applied with a broom, and hacking any smooth places, the mortar is applied in two or three layers, to a total depth of about three-eighths of an inch, straightened with a straight-edge, and rubbed down carefully with a wooden float. When this has set, a thin coat of clear cement is applied with a wooden tool, and rubbed down with a float covered with felt. All smoothing with iron or steel trowels or floats is avoided, as it is found that these dispose the mortar to blister and crack. For surfaces exposed to water, the last application is omitted, and dry cement is sprinkled over the damp surface of the smoothing coat, and rubbed down with a polishing trowel, or with a burnisher.

A LECTURE was recently delivered before the Architectural Sketch-Club of Chicago by Mr. Martin Moylan, on "Practical Plumbing," which has attracted a good deal of attention in the trade, as well as among the architects of the city. As reported in the *Sanitary News*, the lecture was devoted mainly to waste and ventilation pipes, which, as Mr. Moylan truly said, are the least satisfactory of the plumbing appliances at present in use. It will surprise a good many architects to hear that Mr. Moylan greatly prefers lead for soil-pipes, and in the model drainage-system which he described, all the waste-pipes were to be of lead, extra thick, carried straight up in partitions set with six-inch studs for the purpose, and attached to the studding by means of brass lugs, soldered to the pipe, and supported by pipe-rests, fastened to the studs, leaving the portion of the pipe passing through the floor always free for inspection. With waste-pipes of this sort, tested by hydrostatic pressure, and back-vents rather restricted in number, and carefully planned to avoid "by-passes," Mr. Moylan thinks the drainage of his model house would be as perfect as the present condition of the plumbing art admits; and he called upon his hearers to eliminate from their specifications all mention of iron soil-pipes, which, as he says, are of very inferior quality, apt to contain sand-holes or cracks, and liable to fill with rust, even if the plumber succeeds in putting them together so as to make them temporarily tight.

IT is probably true, as Mr. Moylan says, that iron pipe for plumber's use is of very inferior quality, but at present prices for such pipe the manufacturers are certainly not obliged to turn out bad pipe to save themselves from loss, and we should rather prefer, instead of going back to the lead soil-pipes of fifty years ago, to try whether the united efforts of architects, plumbers and inspectors of plumbing could not bring about a change in the morals of iron pipe makers. In Boston and San Francisco, for instance, soil-pipes must, by law, be tried by the hydrostatic test, and if this is faithfully applied, filling the pipes completely from cellar to roof, sand-holes and cracks have a small chance of escaping detection, and the manufacturer of pipes containing them is likely to lose, as a customer, any plumber who finds himself compelled to take down a stack of pipes to remove a defective length. In regard to the other objection which Mr. Moylan brings forward, that iron pipes soon fill with rust, we think he may have been unfortunate in the sort of coating applied to the pipes which he has used. It is certainly the general opinion among architects, if not among plumbers, that a pipe well coated with asphalt will remain free from rust for many years, and, in our own experience, while we have seen both iron and lead pipes corroded entirely through, we have never seen a cast-iron pipe choked by rust. If iron pipe can be properly made, and protected, either by asphalting or by one of the magnetic oxide processes, it has certainly many advantages over lead. A long lead soil-pipe, even if supported as Mr. Moylan advises, must suffer from expansion and contraction, which, it should be remembered, is greater with lead than with any other metal; while its softness exposes it to injury if any alteration should be made in its vicinity. We have seen a lead soil-pipe, apparently cased over securely, battered almost beyond recognition, and the gradual carbonization of the interior decreases its resistance. Moreover, according to Mr. Moylan, the lead pipe should be suspended from the studding, which is liable to settlement, while iron pipe may be, and often is, supported from the cellar floor, like a column, by means of a base specially fitted to it; and even, in the worst cases, is usually hung to the comparatively immovable brick walls instead of being supported by timbers.

A NEW sort of hospital-building is described in *Le Génie Civil*, which seems to have many advantages. The principle of construction seems to be the formation of an iron shell, to which is attached a wooden lining capable of being readily removed and replaced. The lining keeps the room cool in summer and warm in winter, while steam and water pipes can be carried through it, and, by means of a ridge-ventilator, air can be withdrawn from the room at any desired point by cutting openings into the space between the two shells. After being used for a sufficiently long time, the structure may be taken to pieces, the ironwork sprayed with carbolic acid, and painted, and the wooden lining-strips disinfected by baking or by washing with carbolic acid or bichloride of mercury, after which the whole can be put together again for renewed service. The expense of this complete disinfection is estimated at five per cent on the original cost of the structure, which, in Paris, is about five hundred dollars for each bed, for a twelve-bed pavilion, including all the iron-work, carpentry, painting and glazing, plumbing, gas-fitting and steam-heating, together with the beds and mattresses.

SOME AMERICAN MONUMENTS.[1]—IV.

MEMORIALS TO MAJOR-GENERAL ISRAEL PUTNAM.

PUTNAM'S TOMB IN 1875.
BROOKLYN CONN.

THE first memorial erected to Putnam, was an old-fashioned brick tomb, covered with a stone slab, and placed over his grave in the town of Brooklyn, Windham County, Connecticut. It is believed to have been erected by his family. The stone slab bore the following inscription, prepared for the purpose, by Timothy Dwight, President of Yale College:

SACRED BE THIS MONUMENT
TO THE MEMORY
OF
ISRAEL PUTNAM, ESQUIRE,
SENIOR MAJOR GENERAL IN THE ARMIES
OF
THE UNITED STATES OF AMERICA,
WHO
WAS BORN AT SALEM,
IN THE PROVINCE OF MASSACHUSETTS,
ON THE 7TH OF JANUARY
A. D. 1718,
AND DIED
ON THE 19TH OF MAY
A. D. 1790.

PASSENGER,
IF THOU ART A SOLDIER,
DROP A TEAR OVER THE DUST OF A HERO
WHO
EVER ATTENTIVE
TO THE LIVES AND HAPPINESS OF HIS MEN,
DARED TO LEAD
WHERE ANY DARED TO FOLLOW;
IF A PATRIOT,
REMEMBER THE DISTINGUISHED AND GALLANT SERVICES
RENDERED THY COUNTRY
BY THE PATRIOT WHO SLEEPS BENEATH THIS MARBLE;
IF THOU ART HONEST, GENEROUS AND WORTHY,
RENDER A CHEERFUL TRIBUTE OF RESPECT
TO A MAN
WHOSE GENEROSITY WAS SINGULAR,
WHOSE HONESTY WAS PROVERBIAL;
WHO
RAISED HIMSELF TO UNIVERSAL ESTEEM,
AND OFFICES OF EMMINENT DISTINCTION,
BY PERSONAL WORTH
AND A
USEFUL LIFE.

Until 1875 the tomb was in a good state of preservation, but at the end of the succeeding eleven years it showed the desolating marks of the sacrilegious relic-hunter.

AS IT APPEARED
IN 1886.

On one occasion Mr. D. P. Tyler, sought to preserve the slab by taking it to his home, but it was afterwards replaced.

Recently, Mr. W. H. Putnam, a descendant of the General, has signified his desire to present it to the Connecticut Historical Society. Near the tomb are two slabs, resting over the remains of Putnam's wife and two young sons.

THE PUTNAM STATUE.

Judge Joseph P. Allyn, of Hartford, Connecticut, who died in 1869, left by his will five thousand dollars in trust to his father "Timothy M. Allyn, Charles Dudley Warner and Marshall Jewell, for the purpose of procuring a piece of statuary to be placed in the Park at Hartford." And he added, "should others be willing to add to this sum with the design of securing a more valuable specimen of art, that would adorn our city, these trustees are at liberty to unite with them in accomplishing the object." The father of Judge Allyn also gave five thousand dollars, and the subject to be executed, as chosen by the trustees, was a bronze statue of General Putnam. The order for the statue was given directly to Mr. J. Q. A. Ward, of New York. It was dedicated June 17, 1874, with extensive military and civic ceremonies. The statue[2] is eight feet high, standing upon a pedestal of granite ten feet high, designed by Mr. R. M. Hunt, of New York. The latter cost two thousand dollars, and was paid for by the city of Hartford. In presenting the statue to the city, at the time of its dedication, Mr. Warner said, "Perhaps it is proper for me to add that Mr. Ward, working without other authentic portrait than a mere sketch, and yet obliged to conform to the popular idea of Putnam in the traditional likeness, has sought to reproduce the hero of the people, and at the same time to attain a dignified expression of the spirit and gallantry of the Revolutionary time. His figure is that of Putnam the soldier." The Hartford *Courant*, of which Mr. Warner is editor, of June 18th, gave the following description of the statue: "The figure is clad in the uniform of a Major-General of his time. The costume is closely studied from uniforms of the period, and it happens to be as well adapted to an heroic figure as any classic drapery. The soldier stands erect, and in an attitude of motion, about to step forward, as if he had just been summoned. In his right hand, and by his side, he holds his military chapeau; in his left he has grasped his sword and belt, which he presses to his left side as if in some haste. The sword, with

Philip the Good. Charles the Bold.
From the Tomb of Maximillian, Innspruck.

its lion-headed hilt, is a study from Putnam's own sword now deposited in our Historical rooms.

"The weight of the figure is mostly thrown upon the right foot, with the left almost lifted as for a step, the position of the sword and the uplifting of the head, as if in excited attention, all suggest that the repose of the figure is about to be broken by motion, and give a most animated character to the whole. The head, in form and pose, with the leonine locks, is majestic, and the face is lighted up with a most noble expression. It is the face of old Putnam, in a moment of inspiration; it is old Putnam in figure, but face and figure are both somewhat exalted, and seem to be informed with all the glory and enthusiasm of the coming struggle. This is not the place to enter into any detailed criticism; but we cannot but congratulate our city upon the possession of a work of art which would adorn any capital in the world."

Before the arrival of the statue in Hartford, and during its execution, the *Courant* had anticipated its coming and extolled its merits by several complimentary articles, and many persons expected, with reason, to see a masterpiece. It was not, however, greeted by the public generally, or by private individuals of taste and acquaintance with sculpture, as wholly satisfactory. A proper feeling of delicacy toward the father of Judge Allyn, prevented, during his lifetime, any public expression of dissent from the warm praises of

[1] Continued from page 270, No. 650.

[2] See the *American Architect* for September 4, 1886.

the *Courant*. Private criticism declared that the statue failed to give the slightest idea or impression of "the man who went into the wolf's den, the soldier who galloped down the rocks, who hung the spy, who wrote the famous letter, and who left his plow in the furrow, when the news from Lexington was brought to him, mounted his horse and hurried off to the scene of war, without stopping to say good-by to his wife."

"The judgment of reliable persons," they affirmed, "had declared, and the character of Putnam's acts all his life had substantiated it, that 'Old Put' was an impulsive, courageous, dare-devil of a fighter, and not the attendant of a court in the act of caring for his master's accoutrements. A hero, always ready to lead, sword in hand, where any dared to follow."

King Arthur. From the Tomb of Maximillian, Innspruck.

Artists, as well as the public, have criticised, justly, the position and character of the statue.

PROPOSED PUTNAM MONUMENT OF 1853.

At a meeting of the leading members of the Windham County, Connecticut, bar, held in the winter of 1852, the late Judge A. T. Judson, suggested the formation of an association, for the purpose of erecting a monument to Putnam. The committee appointed on this occasion issued a call for a meeting of the citizens of the county to be held in Brooklyn on the 13th of December, 1853, for the purpose of organizing a County Putnam Monument Society. The meeting was held, an organization formed, officers chosen, consisting of a president, executive committee and a vice-president from each town in the county. The Executive Committee entered upon the literary part of its duty with vigor and promptness, by publishing a report of the meeting, accompanied by a lengthy, forcible and eloquent address, setting forth the claims of the Society to public support.

With the issuance of this address, the officers of the Association, with one exception, "rested from their labors." In the following January, the President of the Society, Hon. C. F. Cleveland, addressed a Putnam-monument meeting at Willimantic. But neither his address, nor the above-mentioned efforts, brought a dollar to the hands of the treasurer.

No call was made upon the State, and thus ended the scheme.

A feeble effort was also made under Governor Ingersoll's administration, 1873–74, to awaken interest in Putnam's memory, but without avail.

EQUESTRIAN STATUE OF PUTNAM.

The monument over "Old Put's" grave had become so near an indistinguishable ruin by the wear of time and mutilation of visitors, that in the autumn of 1885, Mr. N. W. Kennedy, the editor of the *Windham County Standard*, made an humble and repeated appeal to all thoughtful, charitable and appreciative citizens to contribute their sums or mites toward the erection of a deserved statue or monument over the old hero's dilapidated grave.

He also called a meeting of the citizens of Brooklyn, and the adjoining towns, to further the object of his appeals. The result was that a Putnam Monument Association was formed in that town, and a general committee of the citizens selected for the purpose of raising ten thousand dollars. It was also decided that, if this sum could not be raised by subscription, the National Congress or the State Legislature should be asked to assist.

At a subsequent meeting of the town an appropriation of $500, was made, but as the other towns in the county had taken no steps in the matter, it was finally decided to ask the Legislature for $10,000, with the expressed hope that at least $5,000 could be raised by private subscription. Accordingly, a committee from the Association presented a petition to the Legislature of 1885–86, asking for the above sum, and it was promptly appropriated.

The resolution making the appropriation required that the monument should be placed over the grave of Putnam.

A single negative vote was cast against the appropriation, by an independent member, who claimed that his constituents would not approve an expenditure by the State which the nation should pay.

A committee of seven leading citizens of the State was appointed by Governor Harrison, "To procure a monument for the grave of the Revolutionary hero, Israel Putnam, in the town of Brooklyn, the cost not to exceed $10,000." Their names were: Henry M. Cleveland, of Brooklyn; Henry C. Robinson, of Hartford; Colonel Heman A. Tyler, of Hartford; Senator George P. McLean, of Simsbury; ex-Lieutenant-Governor George G. Summer, of Hartford; George F. Holcomb, Mayor of New Haven, and Morris W. Seymour, of Bridgeport.

They immediately issued the following curious circular:

"Commission to procure Monument to the Memory of General Israel Putnam.

Hartford, Conn., February 19, 1886.

At a regular meeting of the commission appointed by the State of Connecticut to procure a monument to the memory of General Israel Putnam in the town of Brooklyn, Conn., held at the State Capital, February 19, A. D. 1886, the entire commission being present, it was voted to invite designs for a monument to be erected in Brooklyn, Conn., to the memory of General Israel Putnam, said designs to be submitted to the secretary of the commission on or before the 15th of May, A. D. 1886. No restriction is made upon the nature, style or character of the monument except that its cost must not exceed the sum of ten thousand dollars.

The commission will allow the sum of two hundred and fifty dollars for any design which they may choose to accept.

Voted That the secretary is hereby directed to advertise for designs in conformity with the foregoing vote." Signed by the Commissioners.

Appended to the above were these two sentences:

"In pursuance of the foregoing votes, all persons desiring to compete for said monument will present their designs or models properly sealed on or before the 15th day of May, A. D. 1886. There being no limitation as to the style or character of the design (provided the entire expenses of erecting the monument does not exceed $10,000, ten thousand dollars), every designer may rest assured that his claim shall have a fair and impartial consideration. Yours respectfully, Heman A. Tyler, Secretary of the Commission to procure a Monument to the Memory of General Israel Putnam. Office, 274 Main Street, Hartford, Conn."

And here, also, as with the statue of Nathan Hale, the story of this monument might well stop so far as art or the credit of the State are concerned. The necessity of some account of it, as a matter of history, is the only excuse for continuing.

In response to this circular, twenty-five designs were sent in, not one of which, as might have been expected, came from an artist of any professional reputation. All but four were returned to their fabricators without being exhibited to the public. The four retained for further consideration were submitted by George Keller, E. S. Woods, Karl Gerhardt and the Smith Granite Company, of Westerly, R. I. During the period set apart for the competition, the idea of an equestrian statue was suggested, Gerhardt's design being of this character. As a matter of course, the rejected competitors complained that the commissioners had not acted honorably. This was denied as something farthest from the facts, "the men composing the commission being of the best reputation for honor."

Frederick de Bouillon.
From the Tomb of Maximillian, Innspruck.

In the meantime, also, the question of site became a matter of consideration. The cemetery where Putnam's ashes had reposed in peace for nearly a century was generally regarded as an unfit locality for a State monument costing $10,000. There were those, however, who thought that, for all reasons, the ground sanctified by both the humble and the famous dead, the General, his family and his neighbors, was the proper and fitting place for his memorial, no matter how distinguished its origin might be or imposing its price. Considerations like these had no weight, either with the commissioners or the town of Brooklyn. In keeping with the character of the circular, the kind of artistic enterprise represented by the designs and the public idea conceived of the significance of the monument by the citizens of Brooklyn, the question of site soon became a subject of disgraceful wrangle, jealousy and private recrimination.

It embraced the various elements of influence in the village of Brooklyn, including the churches. Charges and countercharges were made by the parties interested, until it became almost impossible to tell who was right and who wrong. The Hartford correspondent of the New York *Tribune* wrote as follows on August 7, 1886:

"No commission established by the State for a number of years has had a more uncomfortable time reaching conclusions than the commission on the Putnam statue. In spite of the fact that the Act of the Legislature provided for the erection of a monument 'over the grave' of the Revolutionary patriot, the commission and the friends of the Putnam family immediately began the series of efforts heretofore detailed to establish a site for the monument in some conspicuous place in the town of Brooklyn, agreeing to dig up the bones of General Putnam, and thus create a new grave. After several meetings and two journeys to Brooklyn, the commission selected the post-office site, or the point just north of the Mattateo House, not far from the Congregational Church. This should naturally have had the effect of settling all trouble on that score, but it has had the opposite effect, and the factions of the town are very busily engaged in an effort to have the decision changed or ratified, according to which party they belong. The Congregational Society has erected an unsightly board fence just at the rear of the proposed site, and Mr. Thomas S. Marlor is busy trying to get the society to remove the fence, while others are endeavoring to have all obstructions placed in the way of the site and to make it as unpleasant for the commission as possible. Then, again, in the matter of selecting a statue: the twenty-five designs submitted to the commission were as miscellaneous a lot of monuments, statues and designs as ever were gotten together. It was the desire of the commission to secure an equestrian figure, but it neglected to so stipulate in their call for designs, and as there was only one equestrian model submitted, after weeks of delay, the competition has been reopened on an equestrian basis. Meanwhile, the commission has accomplished absolutely nothing satisfactory to itself or those most interested.

Leopold III. From the Tomb of Maximilian, Innspruck.

"Hon. Thomas S. Marlor offered to give to the commission eight eligible lots in the cemetery as a site for the monument. The offer was refused. The town of Brooklyn itself did nothing in the way of offering sites. It, however, held a meeting, the largest ever held in the town, and ardently recommended that one of the two sites, offered free of expense to the town by one of its citizens, should be adopted by the commission."

Mr. Marlor made several other offers of localities for placing the monument, one of which, called the "Mortlake house site," was eventually accepted. The Mortlake house derives its name from the original title of the society, which itself was so called by its Anglo American purchaser of Massachusetts, after Mortlake in Surrey England, his old home.

Near by the site selected is the Congregational Church, which Putnam helped to build, and whose bell he himself rang whenever he was at home, it being an honor accorded him as first among the townsmen. It was in this edifice that the Rev. Samuel J. May, the abolitionist, preached, as a Unitarian. As another characteristic of the town of Brooklyn, it may be added that several years ago, when a monument on the common to May's memory was suggested, it failed, because it was "feared that it would *cumber the green*." Is it any wonder then that Putnam's tomb should go to ruin, and that the town that is honored by his ashes should consent to their removal from the side of his wife and children for the purpose of gratifying a vulgar public display.

Another and interesting historic site was spoken of. It was the identical spot where Putnam left his son Daniel to unhitch the oxen from the plough when he received the news of the skirmish at Lexington, jumped on his horse and hurried to Cambridge.

Another interesting spot in connection with Putnam is the house in which he lived after his return from the War, a paralytic, and where he died. It is about two miles from the centre of the village of Brooklyn and is now occupied by the town poor. The house in which Putnam was born, in Salem, is also still standing.

In the meantime, the site having been disposed of and the ashes of the old warrior removed to it, what of the monument?

After much consultation and the consideration of various influences, the committee decided in the latter part of June that the monument should take the form of an equestrian statue. In order to meet the objection, vital under most circumstances, that one of proper size and quality could not be obtained for the sum appropriated, a sub-committee was appointed, Messrs. Sumner and Holcomb, to ascertain for what sum an appropriate design could be procured. They reported that the above objection had no weight, and that Mr. Gerhardt would furnish an equestrian statue as large as the Washington in Union Square, New York, provide the pedestal, and erect them in Brooklyn for the ten thousand dollars appropriated by the Legislature.

Agreeably to this report, the committee invited all the former contestants to take part in a competition for an equestrian statue, adding another surprising section to the scheme. They decided that the monument must be dedicated on the 17th of June, 1888, or in about a year. On August 31st, five designs were received and placed in the Secretary of State's office. It appears, however, that but three were considered by the committee, those of Woods, Gerhardt and Bissell. That of Gerhardt was selected. As one among many amusing facts in the history of this affair, I quote this from the Hartford *Times*:

"The commission, in trying to reach a fitting conclusion, invited the three competing artists to view the three works, at separate times, and furnish their opinion. This gave each an opportunity of criticising his competitor, of which they were not slow to avail themselves."

The same paper gave an appropriate summing up of the solemn work of the committee:

"The commission appointed by the State was empowered to procure a monument to General Putnam, but forgot the most important part, *i. e.*, his horse. The Legislature forgot that this brute had ploughed with him and earned his bread, taken him to Bunker Hill and made him famous, carried him down Horse Neck and saved his life, inspired him on Long Island and cheered him in the long vigils by the Hudson, and finally followed him in his retirement to the peaceful shades of Brooklyn, and that this horse had thus become a link in the life of the hero that could not be broken. But the horse-sense of the commission remedied this oversight, and when they looked over the field of entries in the first competition and did not see the horse which had filled the void within them, they felt aggrieved and ordered that the artists put their talent and creative abilities in a horse. When the equine show was opened and five full-fledged beasts burst upon their vision, it may readily be surmised that they rejoiced.

"One deluded sculptor had still taken the portrait of General Putnam for his model and placed him upon a spirited charger; but although 'the commission were a unit in favor of the portrait,' the horse did not fill the ideal of their imagination. 'Horse Neck' suggested a long neck; many battles must mean a lean, lank and cadaverous body; torturous paths must bring disjointed limbs and broken bones; and all these qualities were combined in another design. The neck was very long, the body very lean, his legs very weak and decrepit. What matters it if the hero's face resembled an over-ripe tomato, or the arm stretched out in a very straight and angular way, or that the neck was short, and the body terribly disproportioned? The commissioners had yearned for a horse, and although the resting place of this Brooklyn animal had been mislaid and his name forgotten, the sight of this poor wind-broken beast will bring tears to the eyes of any beholder.

"Whatever fault the world at large may find with this model, the commissioners will ever deserve the gratitude of the people for their disinterested efforts in behalf of a poor, friendless and entirely forgotten horse; and when the solemn wilds of Brooklyn wake with the din and pomp of an inauguration, as they will next June, beside the high board fence, and the friends and neighbors of Old Put come to do him reverence, let there be no whisper of surprise or voice of disapproval. Let them simply behold and marvel."

It is to be said in favor of the committee that they refrained from any extravagant assertions in regard to art. They conducted the enterprise in the every-day business way, striving to get the largest amount of metal, in the shape of a horse, for the money they had at their disposal. On many points their conduct was freely criticised, though in no way affecting the result. Political and personal influence were in favor of the person who received the commission. It is affirmed, by some, that this fact put a stop to all private subscriptions, and it is certain that several gentlemen of large means who proposed to give generously in aid of raising the additional five thousand, refused to give anything. This is not, curiously enough, a very vital point, for it is pretty certain that the Legislature can be relied on to make up losses or provide other appropriations in case of need. In fact the contract had hardly been signed before the suggestion was made that it was not fair to permit the maker of the Putnam to suffer loss.

The transactions of the Hale and Putnam Monument Committees do not seem to show that the art of statue and monument making has made much progress in Connecticut since the committee on the Groton structure made their modest appeal to the Legislature in 1825. Nor do they indicate that the persons who have had opportunities of seeing and studying good statues and monuments, and who served on these committees, were actuated by any higher motives or more delicate sensibilities, than their associates who swung the hammer, or followed the plow. In fact, if the different conditions, existing in 1825 and 1886, were contrasted, it would be

found that the character of committees has very much deteriorated. The Groton monument was, so far as known, free from political jugglery, and an honest unpretentious piece of work. It is a pity that the same cannot be said of the Hale and Putnam statues.

T. H. Bartlett.

[To be continued.]

THE ILLUSTRATIONS

[*Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.*]

THE BANK OF MONTREAL, MONTREAL, CANADA.

[Gelatine print, issued only with the Imperial Edition.]

A description of this building will be found in the *American Architect* for April 9, 1887.

COMPETITIVE DESIGN FOR THE CITY-HALL, CAMBRIDGE, MASS. MESSRS. CHAMBERLIN & WHIDDEN, ARCHITECTS, BOSTON, MASS.

TOWER OF THE NEW STATION FOR THE CANADIAN PACIFIC RAILROAD, MONTREAL, P. Q. MR. BRUCE PRICE, ARCHITECT, NEW YORK, N. Y.

During the early spring the original and revised designs for this building were published in *Building.*

NEW PREMISES FOR THE UNITED STATES TRUST COMPANY, WALL ST., NEW YORK. MR. R. W. GIBSON, ARCHITECT, NEW YORK, N. Y.

DESIGN FOR DEDHAM INN, DEDHAM, MASS. MESSRS. WHEELWRIGHT & HAVEN, ARCHITECTS, BOSTON, MASS.

DESIGN FOR A COUNTRY CLUB-HOUSE AND A COUNTRY HOUSE. MR. HUBERT WESTELL, ARCHITECT, NEW YORK, N. Y.

HOUSE AT WASHINGTON, PA. MR. E. G. W. DIETRICH, ARCHITECT, NEW YORK, N. Y.

MEDIÆVAL HOUSES.[1] — I.

A PRIMARY classification of the dwellings of Mediæval times into country houses, city houses, manors and palaces or hôtels, suggests itself to the student. The real country house was that of the peasant-farmer living upon the seignorial lands. Among the city houses those of the nobles are distinguished as palaces or hôtels. Until the twelfth century, however, few of the nobles dwelt in the towns, the old customs of the conquerors of Gaul being followed by many generations of their descendants.

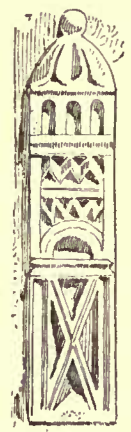


Fig. 1.

Modifications in the Gallo-Romanic dwellings followed slowly upon the invasions of the fifth and sixth centuries. The conquerors occupied the Roman "villas," living in the country rather than in cities. They built houses for their farmers and serfs, these houses necessarily conforming to the plans already in use. The manners, tastes and habits of a people are recorded in their domestic architecture. The plan of the dwelling is modified almost imperceptibly, and even the greatest tyranny hardly goes so far as to attempt any radical change in the homes of a conquered race. The invader, on the contrary, yields at first in those matters to the customs of the vanquished people, especially if the latter be the more civilized, but by slow degrees he moulds their habits into the direction of his own characteristics and traditions, making compromises between opposing customs, which in a century or two transform the dwelling of the first possessor of the soil, not so radically, however, but that some very apparent traces of the old customs and of the primitive structure remain.

During the Carlovingian epoch the country houses of France were of a defensive character, while in the town houses the spacious breadth of ground-floor which had characterized the older dwellings was supplanted by the system of piling story upon story, the defence of the towns by circumvallation, now well recognized, necessitating a more circumscribed ground-plan. Although the Romans in Gaul never used wood to any extent in their own construction, it is evident that the Gauls never quite ceased to use it, and that while during the Roman domination they gave greater importance to masonry, their skill in wood-construction was soon regained under the impetus of the Northern invasions. The art of carpentry employing exclusively wood in construction belongs only to the Indo-Germanic races. Wood enriched by painting played an important part in constructions of the Merovingian epoch, and the frequent fires which destroyed entire cities during the first centuries of the Middle Ages attest the almost exclusive use of carpentry in private dwellings.

Of houses built prior to the eleventh century nothing remains, and we can only form an idea of what they were from the laconic documents of the period, some very imperfect sketches, and a few bas-reliefs. But these writings, though vague, are sufficiently conclusive as to the important fact that the early Mediæval houses were made of wood, with a mixture of carpentry and of the piling up of timbers joined at the angles.

There were two ways of building in wood: the simple piling up of the trunks of trees squared where they joined at the corners; and the more or less ingenious systems of using wood for supports, for ties and for fittings in the erection of wooden buildings, which were extremely solid, very light, and sometimes carried up to a great height.

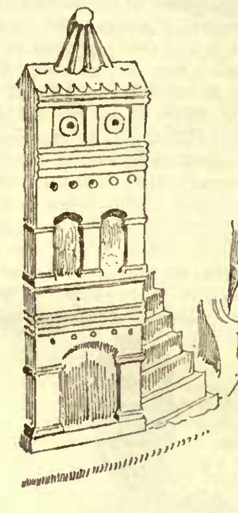
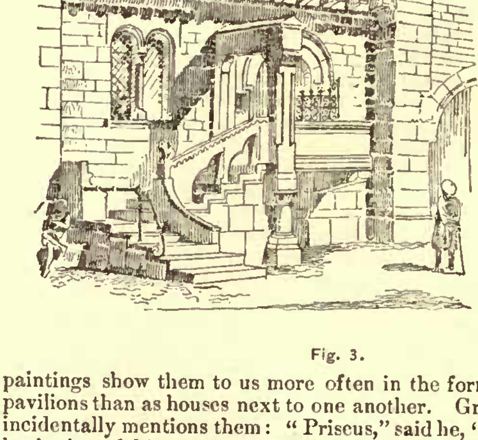


Fig. 2.

The first of these methods was not used by builders of any degree of intelligence, while the second belongs to the white races and was practised by all the peoples coming from the Northern plains of India, by the Scandinavians, the Francs and the Normans. The accounts that have been found of houses of the Merovingian and Carlovingian epochs show traces of the method of wood-construction by piling, of a well-developed knowledge of building in wood by timber-work, and of Gallo-Romanic traditions. In the oldest remains of French houses dating from the end of the eleventh century, we still perceive the strength of these different influences and discover the Gallo-Romanic traditions in more or less purity. The architecture of France in the Middle Ages made singular movements backward and forward, swayed by the predominance of the Gallic or German character over the relics of Latin civilization, or of local traditions and the tastes of the Trans-Rhenish invaders. Thus, as late as the twelfth century, during the greatest development of the Clunisian and Cistercian monastic orders in cities dominated by their influence, the house was constructed in masonry, the Roman traditions resisting the influence of those of the North, while in the more independent cities, or in those under the royal power, the wooden house supplanted day by day the house of stone. The more or less abundance of either of these materials near the centres of population does not seem to have had a decisive influence on the system of construction adopted, a singular fact which may be found explicable after further study.

CITY HOUSES.

The scarcity of ground in cities or walled towns obliged builders to raise several stories above the ground-floor. The houses of ancient Rome had a number of stories, but it does not seem that this method was followed in their provincial towns. In Pompeii, with very few exceptions, houses were only one story high, and ancient paintings rarely show them of greater height. In the Merovingian epoch, city houses had several stories above the ground-floor; contemporaneous authors mention this, and their sculptures or paintings show them to us more often in the form of towers or high pavilions than as houses next to one another. Gregory of Tours thus incidentally mentions them: "Priscus," said he, "had ordered, at the beginning of his episcopate, that they should carry up the walls of the episcopal house." "The Duke of Beppolen being at table in a house of three stories, the floor fell in."



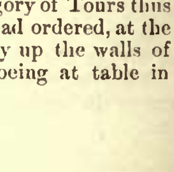
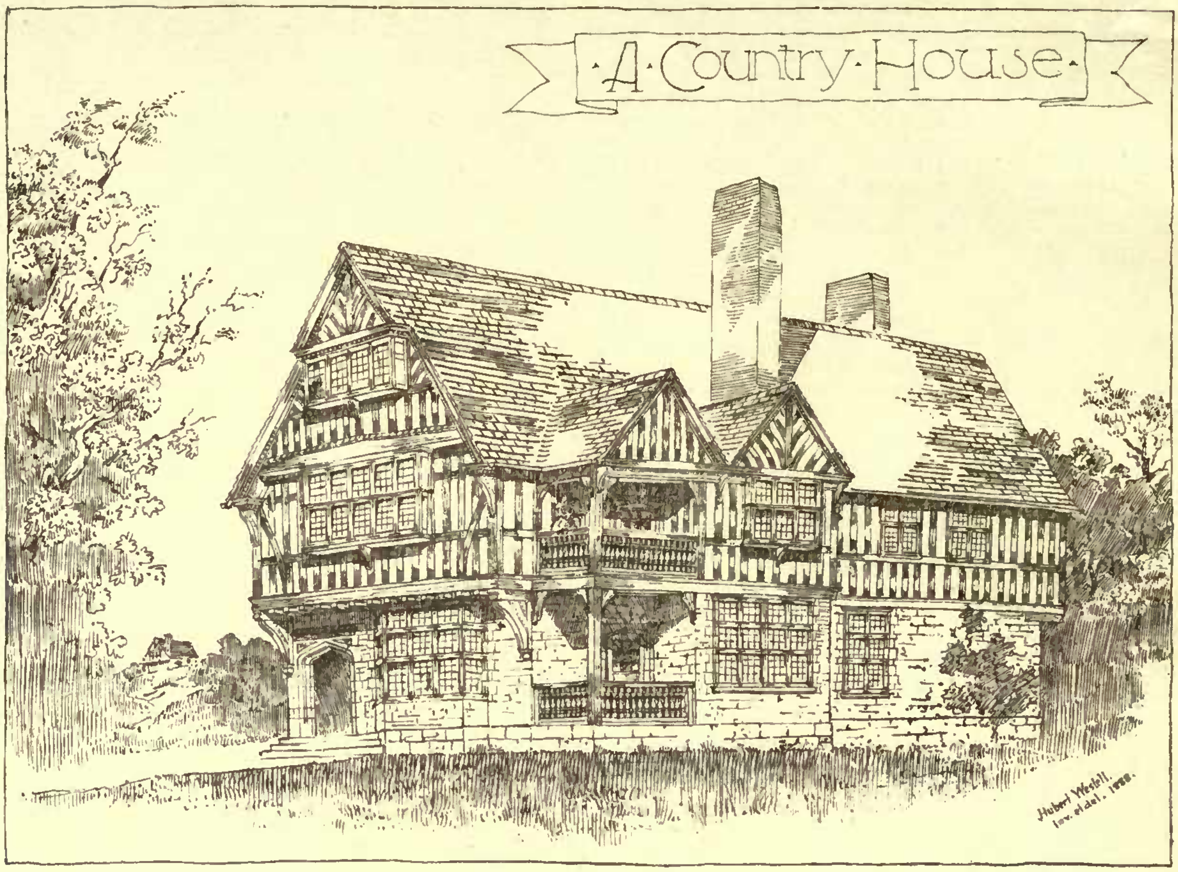
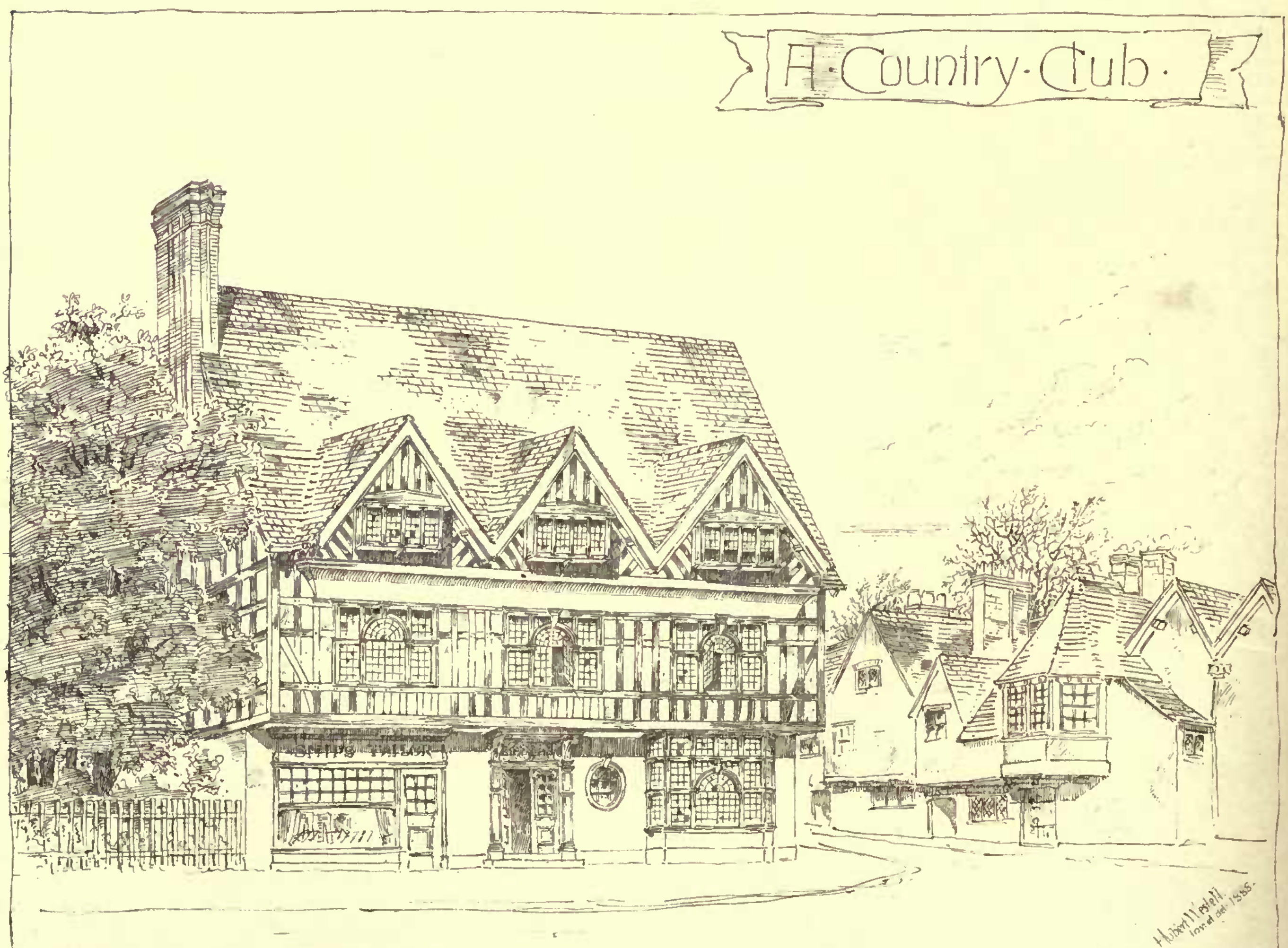


Fig. 3.

[1] Translated from the French of Viollet-le-Duc, by Mr. A. B. Bibb.

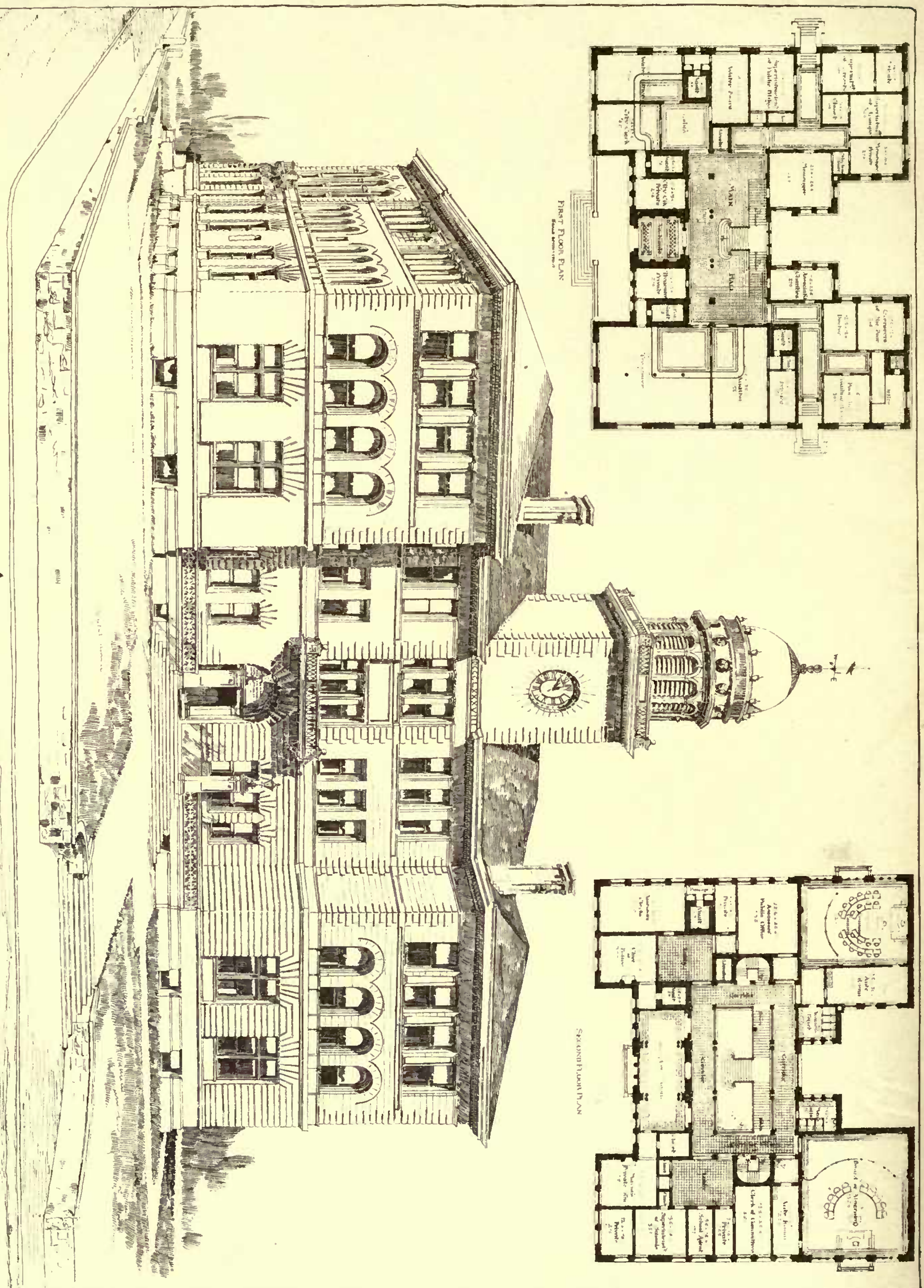
COPYRIGHT 1888 BY TICKNOR & Co





Heliotype Printing Co. Boston.

COPYRIGHT 1888 BY TICKNOR & Co



CAMBRIDGE CITY HALL
[NOT ACCEPTED]

Heliotype Printing Co. Boston.

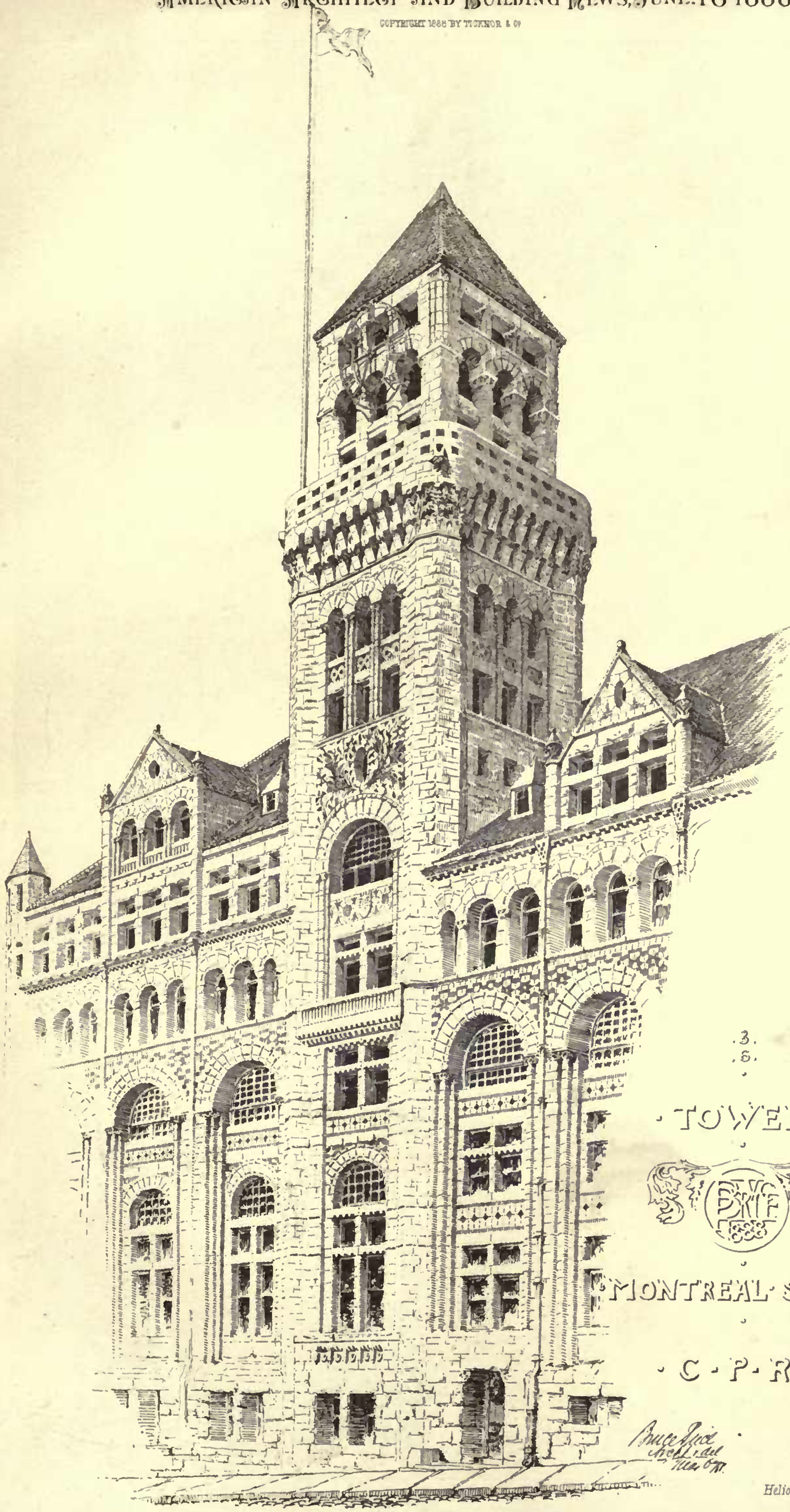
COPYRIGHT 1888 BY TICKNOR & CO.

Heliotype Printing Co. Boston

Office of United States Trust Co. New York, N.Y.

American Architect and Building News, June. 16 1888. No. 651.

Copyright 1888 by Ticknor & Co



.3.
.6.

· TOWER ·

BY&F 1888

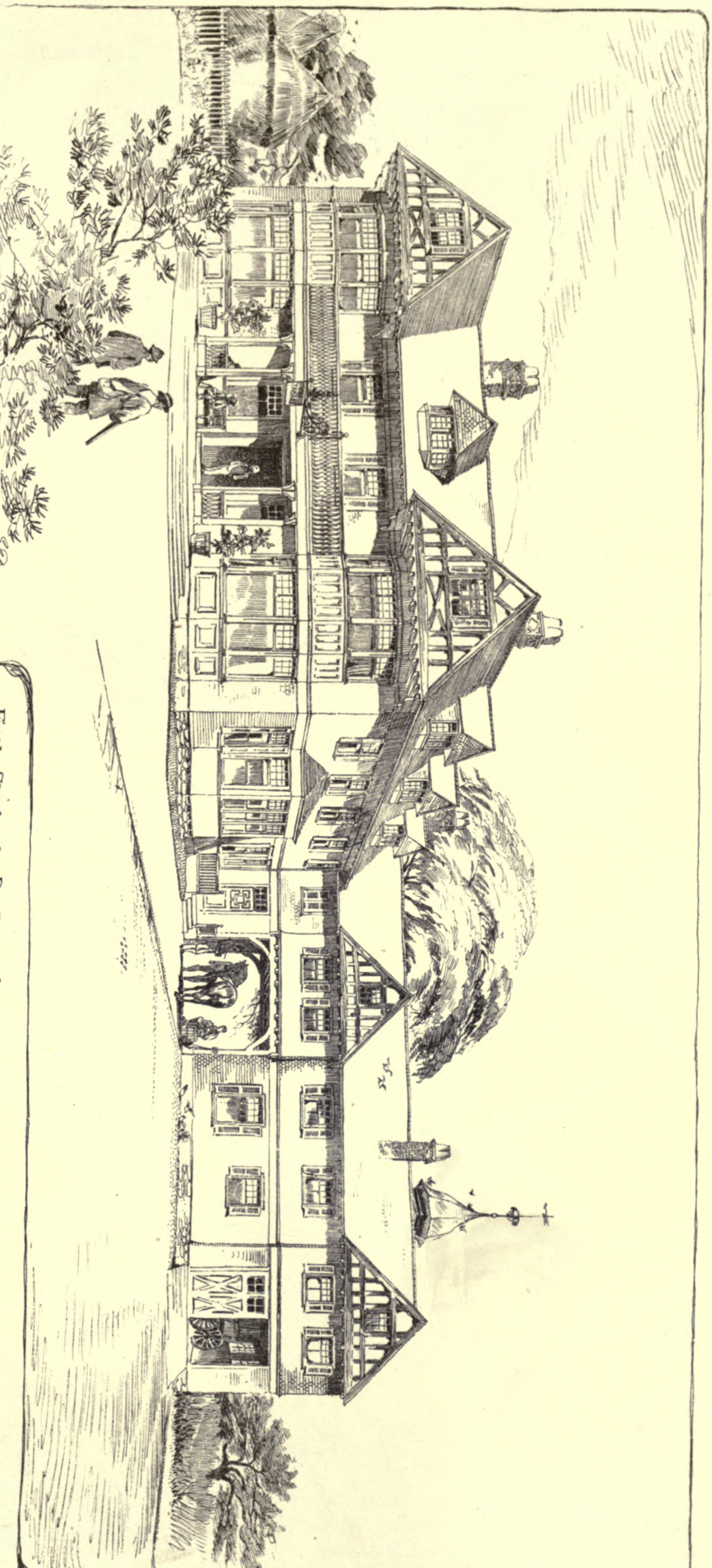
· MONTREAL · STATION ·

· C · P · R ·

Bruce Price Archt. del

Heliotype Printing Co. Boston.

COPYRIGHT 1888 BY TICKNOR & CO



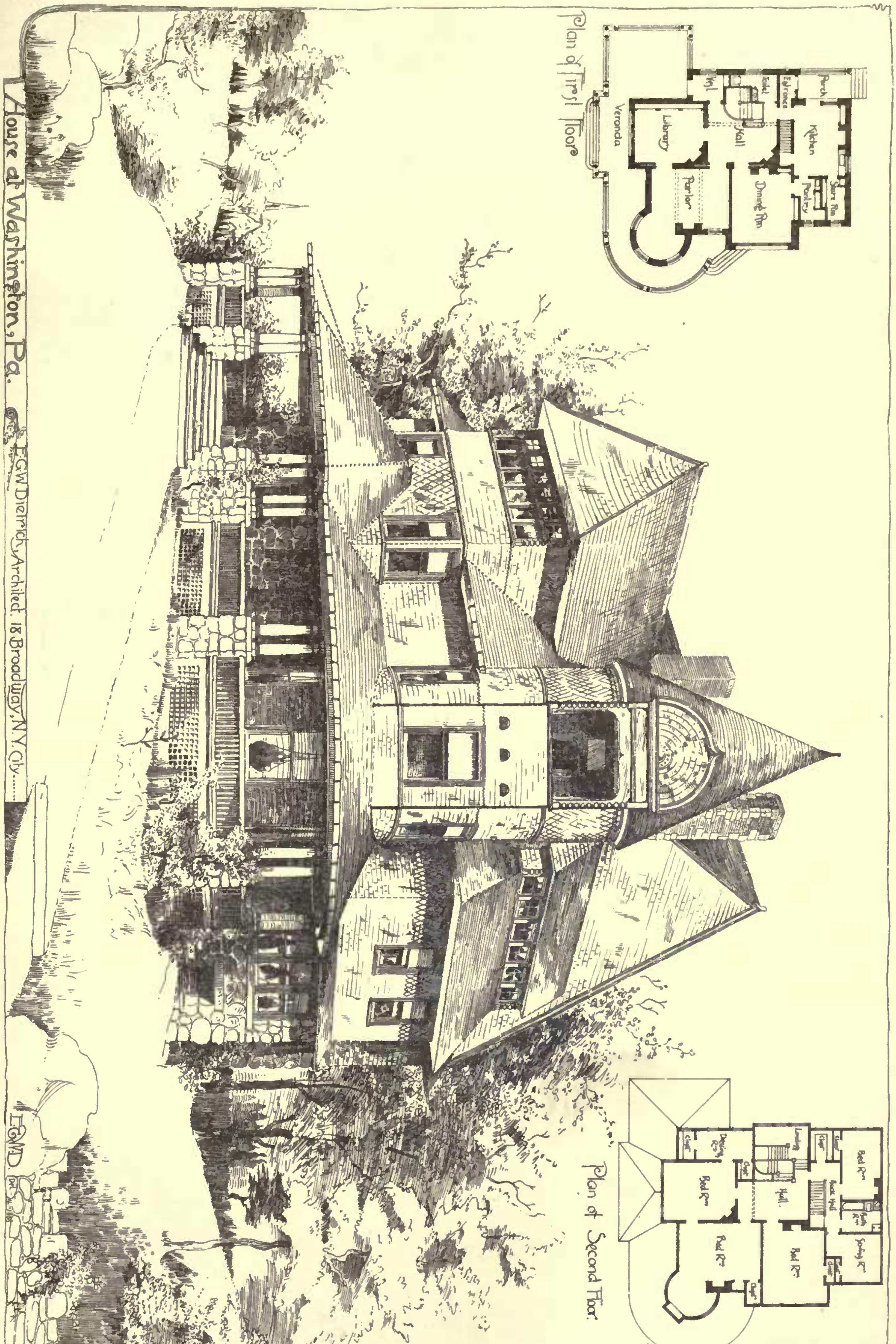
First Study for Dedham Inn.

Wheelwright & Haven. Architects . .
6 Beacon St. Boston, Mass.

Heliotype Printing Co. Boston.

American Architect and Building News, June. 16 1888 No. 651.

Copyright 1888 by Ticknor & Co



Heliotype Printing Co. Boston.

The Merovingian houses, of which there are many traces to be found in the north of France, consisted generally of a stone cellar, not arched, and surmounted by a wooden building of small perimeter, the rooms being necessarily one above the other. Figures 1 and 2 are houses built after this plan.

Figure 1 shows evident wood-construction. It is from the carving on a capital of the first church of Vezelay, antedating the establishment of the corporation and the reconstruction of the church early in the twelfth century. In the same locality numerous fragments of stone houses are still found, dating from the beginning of the twelfth century. Aug. Thierry, in his "*Letters on the History of France*," speaking of the changes made by the establishment of a corporation in Vezelay, mentions the tendency of free citizens to surround themselves with exterior signs of their independence. "They raised around their houses, each according to his wealth, battlemented walls. . . . One of the most important among them, named Timon, laid the foundations of a large square tower."

Figure 2 shows one of those exterior stairways which were sometimes of circular form and are often found in the houses of the eleventh and twelfth centuries. On the Bayaux tapestry, Harold and his companions are depicted banqueting, on the day of his departure for Normandy, in a great hall on the first story of a building, which has a ground-floor of arcades and an outside circular stairway descending from the *salon* to the shores of the sea. The ground-floor is evidently of stone, while the story above looks like woodwork. The outside stairway is found in the Greek manuscripts of the eighth century (see "*perron*"), and its use survived as late as the sixteenth century.

It is worthy of note that in France, during the first period of the Middle Ages and as late as the twelfth century, private dwellings still followed the ancient Gallo-Romanic traditions for the ground-floor, while they had adopted the northern models for the upper stories. The northerners doubtless spared many of the Gallo-Romanic city houses and country places, which were of one-story

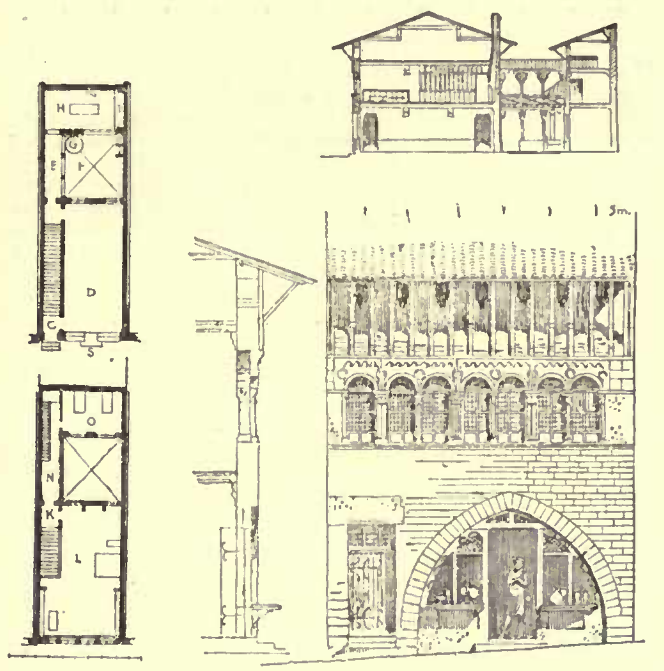


Fig. 4.

only, and built wooden houses upon their walls. They could thus have rationally developed a system of construction from the two methods, engrafted upon one another by the mixture of the two civilizations. In stone-work the Gallo-Romanic influence was felt very late, but the wooden buildings had from the first a character which belonged unquestionably to the northern races and bore no resemblance to Roman carpentry.

This combination of the constructive systems of two opposing civilizations was a slow process, and the twelfth century hardly saw the intermarriage completed.

The lay school of the thirteenth century may be said to have entirely abandoned the Roman traditions, and it was only at this period that private buildings became truly French, homogeneous and logical in the use of material.

The Western manuscripts of the ninth, tenth and eleventh centuries, the ivory carvings of the period, and the Bayeux tapestry, define the Gallo-Romanic influence in the stone ground-floors of houses of the times, the Indo-Germanic methods appearing in the superimposed wood-construction.

Meanwhile the churches remained consistently Latin or Byzantine. While the nobles and burghers allowed the monks to arrange the architecture of their monasteries according to their customs (and these were Latin by tradition), they still controlled the building of their own dwellings, and despite the antipathy existing between the conquering tribes from the other side of the Rhine and the old Latinized Gauls, it would seem that in contact with these purer races, the Gallo-Roman remembered his origin, recovering, little by little his native tastes, shaking off the influence so long felt of the Roman arts, and struggling to found an art of his own. So that even in the twelfth century the domestic and monastic styles had widely separated in their art and in their methods of construction.

Civil architecture was born with the establishment of municipalities, and it at once took on an independent form, as much so as did the feudal castle which departed more and more from its model, the Roman villa, to whose traditions the abbeys alone remained faithful. It is always interesting to note that among a people left to its instincts, the arts, and especially that of architecture, reflect the tendencies of the popular mind.

In the twelfth century monastic architecture reached the fullness of its glory and entered upon its decadence. Saint Bernard tried to restore the meaning which it had gradually lost, by requiring simplicity as a first condition, but, after his time, the rigid art which he had tried to set up as a type for religious establishments was drawn into the common torrent.

Feudal, military and domestic architecture, on the contrary, developed with wonderful activity, the old remains of Roman arts were ignored, and nobles and people alike began to build in a style sufficiently flexible to satisfy all the varying needs and changing habits of society.

As soon as the power of the religious establishments was weakened the municipal and political spirit revealed itself, and before the century was past the industrial arts were solely in the hands of those men of the towns, who fifty years earlier had gone to the convents for everything, from the plan of a palace to the lock of a door.

It is unfortunate that nothing is left to us of those city houses of the eleventh century, in which the Gallo-Romanic traditions were mixed so strangely with the forms of architecture brought in by the North German tribes and by the Normans. Very imperfect accounts of the times are found in the manuscripts, from which, however, we can prove the existence of woodwork analogous only to the old woodwork of Denmark, of the Tyrol and of Switzerland.

The French city house of the end of the eleventh and the commencement of the twelfth centuries was no longer Roman. The windows did not open, as in ancient houses, upon an interior court, but upon the public street; the court, if it existed, was reserved for domestic uses. The entrance from the street was directly into the principal room, and nearly always raised several steps above the ground. If the dwelling was of some importance, this first room, in which they received and held their banquets, was supplemented by a back room, which served as a kitchen, or on ordinary days as a dining-room. The chambers were on the first story.

Figure 3 gives the plan of a house of the beginning of the twelfth century. From the street the entrance to the *salon* (A) is by a winding staircase, having a first landing with a seat and a second landing, before the wide entrance door, carried on a corbel or supported at the outer angle by a small column. Beneath this landing was the descent to the cellars, which were generally spacious, well built and vaulted, with central columns and double arches. Two-storied cellars were sometimes built in the wine countries.

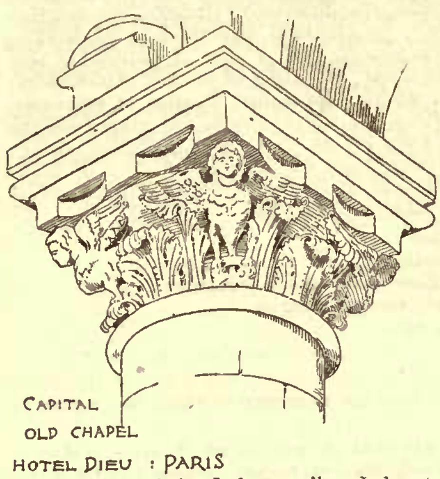
Beside the entrance door, which was wide and heavily bound with iron, was a small opening from which to reconnoitre any one knocking. From the first *salon*, which was not generally lighted except by a window at the back and by the door in fine weather, the passage-way B leads to the "snail" staircase which ascended to the first story, and under which was the entrance to the small interior court D, common sometimes to several dwellings and having a well. From this court the back room C, used as a kitchen, was lighted. On the first story the arrangement was the same, the front room serving as a bed-chamber for the family, and the back room for the servants. This first story was very often of wood. More than half the front was pierced by generous fenestration and was shielded by a projecting roof, the walls, double at this period, seldom showing a gable to the street.

The panelled front of the first story was framed of large timbers carried upon very strong joists, the other end of which rested upon the partition wall, the spaces between the timbers being filled-in with rough-cast. Upon the surface of the stucco were traced incised designs. The soffit of the projecting roof and the panels were painted in striking colors, yellow and black, white and brown or red, or red and black. At the side of the plan is a view of the front of this Romanesque house.

[To be continued.]

THE DETROIT RIVER TUNNEL. — A dispatch from Detroit announces that a syndicate has been formed to tunnel the Detroit river from Canada to the Michigan shore; that engineers have investigated the matter and find that the tunnel can be constructed with ease, and that a company with $100,000.00 capital has been formed in Canada to carry out the project. Among the projectors are Messrs. D. O. Mills and George Bliss, of Morton, Bliss & Co., of this city, together with prominent California capitalists and the officers of the Michigan Central Railroad. Mr. D. O. Mills was seen at his office in the Mills Building and admitted his connection with the scheme, but said the business arrangements had not yet been so completed as to enable him to say much about it for the present. He, however, expressed a belief that the tunnel would be constructed, and thereby complete a railroad system from the Atlantic to the Pacific by way of Detroit. Mr. Bliss declined to talk on the subject. — *Mail and Express.*

EXHIBITION FOR THE PREVENTION OF ACCIDENTS.



IN former reports I have called attention to certain laws of the German empire insuring working people against accidents. To make these laws more effective and particularly to show practically how accidents may be prevented the project of an exhibition is near its realization. The exhibition is to take place from April to June, 1889, and the Prussian government has permitted the gratuitous use of the large exhibition place in Berlin near the Thiergarten and the Lehrte railroad depot for that purpose. The invitation to participate in the exhibition is extended to all nations, and I deem the project of sufficient importance to make it the subject of a report to the Department of State.

Permit me to give you from circulars and pamphlets before me, and from personal inquiry, a detailed statement regarding the objects and purposes of the exhibition.

The articles to be exhibited shall consist in machinery, apparatus of all kinds now in use to guard against accidents, in tools, working pieces and working materials, in models; in plans, drawings, photographs and specifications; in copies of regulations, rules for factories, statutes and printed matter relating to accidents and to their prevention, as far as they come under the province of trades and factories defined by the German accident insurance acts (Unfallversicherungs gesetze des Deutschen reiches). All articles that relate generally to the protection of laborers and to the promotion of their welfare and safety at the works insured will be admitted.

As a rule the exhibition of articles in natural size and of models will be prepared. Machines should, as much as possible, be exhibited in operation. Since not only protective contrivances but also complete machines and apparatus with protective devices are to be exhibited, the exhibition will have, to some extent, the character of an industrial exhibition, with the difference only that objects which serve solely for technical purposes, and cannot be classed as contrivances for the protection of working people against accidents, are excluded. It is not intended to show merely the efficiency of any machine, but rather the efficiency of the same in connection with devices for the prevention of accidents. The best protective device does not render a bad machine recommendable; but a machine, good in itself, furnished with model equipment for the purpose of preventing, as much as possible, accidents, must in future, considering the burden, under the accident laws, cast upon the trade associations, of necessity deserve preference over a like good machine, being, however, without satisfactory appliances for protection. The exhibition will, therefore, offer an opportunity particularly to all manufacturers of machines who hitherto have taken a special interest in the question of such perspective measures, or, in future, intend to do so, to introduce their productions to the members of trade associations.

But not only the participation of manufacturers of machinery and of persons who construct protective devices, the exhibition is also intended to familiarize all parties interested with the character and technical merits of all protective devices in use, and to give them an opportunity to judge of their value and effectiveness. It is therefore considered of great importance that owners of factories and others who use or who are to use such protective devices, and not merely manufacturers or constructors of such, should send models, drawings, photographs and specifications to the exhibition.

Groups 1 to 12 contain detailed suggestions to enable manufacturers and masters to answer for themselves the question, how far their p rticipation in the exhibition may be conducive to valuable results.

No one should incline to the idea that any device he has introduced for the protection of laborers is too insignificant to deserve exhibition. The prospectus says: "To this exhibition the motto applies, 'No thing is of so very little value as not to serve to protect and preserve human life.'"

In the classification of the articles to be exhibited the point of view was taken that many machines, apparatus, etc., are of so general a nature — such as motors, transmitters, elevators, steam boilers — that they and the protective measures to be applied to them might be regarded as a feature common to all works and factories insured. The division into groups provides, therefore, for a department A (groups 1 to 10), which embraces these interests in common, while an additional department B (groups 11 to 21), takes into consideration the special interests of single trades. A third department, C (group 22), embraces literature in relation to all these subjects.

. . . .

If the division into groups does not precisely define the limits of the prevention of accidents, but considers also the protection of laborers generally and their well-being at works insured, the following reasons may be cited for so doing:

Prevention of accidents and prevention of disease cannot be easily separated. The sudden action of poisonous gases produces upon the human organism frequently an injury which is denoted as "accident"; while in case of gradual action of the identical gases in the course of years an injury is caused which is designated as "industrial disease." Yet, doubtless, all that is done towards the prevention of such diseases must be likewise considered as a measure for the prevention of accidents. Thus in some instances the removal of steam and dust must directly be regarded as a measure to prevent accidents, since, as experience teaches in workshops which are filled with dust masses or opaque steams, accidents more frequently happen than in places with pure air and free outlook. But an additional argument may be adduced. A laborer who works in a good, wholesome air will meet imminent danger with a much clearer head than the person whose head is affected by bad air, in which he is compelled to perform his day's work. Nor will the healthy, strong laborer as easily succumb to the consequences of many accidents. From these and other cognate reasons devices for the ventilation of workshops and many other things which, at the first glance, may appear as extraneous and hardly appurtenant to an exhibition for prevention of accidents, have been embodied into this division of groups as subservient to the ends of the exhibition.

Special attention has been bestowed upon the protective measures on movable machine parts, as official statistics compiled for the year 1886, at the imperial insurance office, show that irrespective of the prevalence of various occasions for accidents in the several trades in the entire sphere of "insurance in case of accidents," such accidents as were caused by movable machine parts, occupy, among the more severe cases, the first place in number. Not less than one hundred thousand cases of accidents were reported in the year 1886; 10 per cent of the laborers injured under the insurance laws being entitled to an indemnification.

. . . .

DEPARTMENT A — GROUP III.

Protective measures in the working of elevators, derricks, cranes, and lifters. — Safety casings for approaches to elevators and lifters; self acting shutters; basket roofs for protection against falling bodies; devices for securing (holding in place) the raising-box in loading and unloading.

Driving, stopping, and breaking devices; catching devices; signal system for indicating the motion of the elevator; signal boards, and boards of warning; work instructions; hydraulic and pneumatic lifters; elevators; cranes of all sorts; safety cranks and windlasses, winches, safety chains, cords, and belts; exhibition of entire sets of elevator arrangements.

. . . .

GROUP VI.

Preventive measures against and saving means in case of fire in works insured. — 1. Fireproof building constructions generally; construction and material of partition walls and ceilings; roofing, fire-escape doors, etc.

Safe storage of supplies and waste: Measures against spontaneous ignition of materials; incombustible curtains for the prevention of the spreading of fire generally at working places; fireproof impregnation of wooden parts, stuffs, and working implements; asbestos and its application for fireproof devices; measures of precaution for heating; apparatus for dangerless boiling of varnish, pitch, and other easily inflammable matters.

Spark catcher. — Lightning-rod constructions:

2. Apparatus indicating too high temperature in drying-rooms and the out-break of fire.

Automatic quenching devices: Hydrants, system of pipe conduits; use of boiler steam for quenching; use of existing driving gears for the operation of quenching apparatus; water reservoirs; quenching tubs; hand, steam, gas fire-engines; extinguishers; quenching bombs.

3. Fixed and movable saving or escape ladders, escape nets, clothes, and hose, cords.

Organization of fire brigades; equipment of firemen: Representation of spaces and arrangements for keeping ready-quenching and escape implements; directions of service.

GROUP VII.

Provision for good lighting and prevention of accidents from lighting devices. — Apparatus and articles of all kinds which serve for lighting closed working spaces, and of working places in the open air; lamps, lanterns, etc.

Devices for lighting from outside spaces presenting danger of fire and explosion: Safety lamps and lanterns; safety fire-lighters; electric gas-lighters; use of phosphorescent colors.

Safety receptacles for working establishments for the reception of larger supplies of petroleum and burning oil: Apparatus for dangerless and cleanly taking small quantities of oil out of the receptacles (retail distribution for daily demand).

Devices for dangerless self-manufacture of lighting gas (from coal oil and waste): Electric lighting constructions for works, especially with a view of utilizing existing working forces. Organization of the lighting system and works; provisions (rules) as to filling, lighting, and extinguishing of oil lamps; as to the management of gas

conductors; as to the procedure in case of imminent gas explosion; as to the attendance of electric lighting machines and conductors.

GROUP VIII.

Prevention of accidents from poisonous and corrosive substances from obnoxious gases, etc. — Apparatus for safe storage of poisonous and corrosive substances used at works; litters and hand-cars for dangerless moving of vessels containing acids; devices for dangerless taking of smaller quantities of acids out of vessels and receptables.

Devices to prevent a rise of poisonous fumes at the openings of charging furnaces and apparatus; closures of retorts and the like; mechanical devices by which obnoxious substances are worked instead of by working men; communications as to the use of non-injurious materials instead of poisonous raw materials and products, or of such detrimental to health.

Ventilators, exhausters, and exhausting arrangements generally for the absorption of poisonous or injurious gases for the freeing of working-rooms from dust masses and steam.

Devices of every description for airing and heating work-rooms; devices for moistening and cooling the air in workshops; apparatus for the examination of the working air in relation to any gases, dust, moisture, etc.

Washing, bathing, and privy arrangements for working establishments; articles of equipment, for the working-people's clothing, and eating, of work kitchens.

GROUP IX.

Personal equipment of working people. — Work dresses suited to use for transmission attendants, as well as for male and female laborers near machines generally.

Protective eye-glasses and masks of every description for protection against pieces of working materials scattered round; gloves for use in handling, pushing, and sharp-edged work pieces; leather apron and gaiters of leather furnished with iron plate; shoe coatings and special shoes and boots for like purpose.

Work dresses affording protection against unusual temperatures or wetness; diver's clothing; articles of equipment for the handling of glowing masses, hot or corrosive liquids; use of asbestos, glimmer, etc.

Respirators of every description for protection against dust and gases when at work.

Helmets or cask apparatus with devices for the admittance of fresh air; equipment of men who, for the saving of persons, met with an accident, repair to places filled with fumes, steam, or fatal gases (building on fire, canals, pits, wells, etc.)

Detailed communications as to the experiments made especially with the various systems of protective spectacles and respirators at the works insured; for the elimination of the really useful information from the unavailable.

Devices for the protection of laborers attached to simple tools; for instance, protective baskets to chisels for catching chips and splints in riveting works; hilt baskets on blades and on hooks for getting extraneous bodies out of roller pairs, etc.

Improvements in tools of every description with a view of preventing accidents — for instance, safety guards in fastening hammer handles.

GROUP X.

Provision for injured laborers. — Instructions for the first assistance in accidents for the use of the persons employed at the works insured; suitable material and boxes for dressing wounds; litters, transportation caskets, and cars and the like; providing for rooms to dress wounds at works and for houses for sick and invalid laborers; artificial limbs for mutilated persons, and mechanical arrangements for the assistance of mutilated persons in lighter works — for instance, clock movements which make an artificial arm automatically to perform certain work.

Information as to the occupation of invalid laborers.

DEPARTMENT B.

Protective measures, chiefly of interest for several trades or groups of trades. — Here the following points of view must be considered: Motors of the several trades, or models, drawings, and photographs of motors, with model equipment; surrounding-guards of movable parts; expedient disengaging and lubricating devices; devices against the out-springing of rotary tools; devices (near machines) for the protection of laborers against parts of work pieces splintering off and against materials flung away, against dust developing during work, against obnoxious fumes, etc.; automatic feeding devices, as well as machines and mechanical appliances of every description performing work in the place of laborers — for instance, automatic introduction of stuffs and materials into stamping, kneading, pulping, and rolling works; substitution of hand-work near lixiviating-vats by automatic stirring and scooping works, etc. — with or without protective devices; apparatus under pressure and other apparatus peculiar to the several trades with model equipments, with a view of preventing accidents and of protecting laborers; protective measures near or on furnaces, stoves, or hearths; on basins and deepings; against falling bodies; in the treatment of explosive, inflammable, corrosive substances, and other preventive measures of every description for the protection of life and health of laborers, according to the peculiarity of the several trades; instructions of service in relation thereto, notices of warning, directions; representation of entire working establishments or departments of whole standard establishments (models, plans, photographs, specifications); situation, construction (building, material, style); judicial total disposition of the working places and working arrangements with a view of preventing accidents; location of boiler shops; mounting of motors, transmitters; grouping of mótors and working apparatus; location of staircases, lifting and raising apparatus, the storing-rooms, and magazines, the railways, junction-rails, water canals, etc.; lighting, heating, airing; charity and humane arrangements for laborers; designs of model establishments for the several trades; collective exhibitions, all of which is to apply to the subsequent groups:

Group 11: Metal industry.
Group 12: Wood industry.
Group 16: Chemical, glass, and ceramic industries.
Group 17: Mining and quarry industries.
Group 18: Building trades.

. . . .

Industries and trades carried on on account of either of the states or of the empire are to be annexed to groups to which they naturally belong:

1. For exhibition are admitted all articles which are qualified to promote the ends of the exhibition (compare sections 1 and 2 of this report). Foreigners are invited to exhibit.

2. Articles to be exhibited must be reported on a special form intended for that purpose, and obtainable from the secretary of the exhibition. The bill of application must be transmitted in duplicate at latest by July 1, 1888, to the secretary of the exhibition, Director Max Schlesinger, No. 3 Koch Street, Berlin, S. W. Whether such application has been accepted, would-be exhibitors will receive notice as soon as possible upon receipt of their application.

3. Every exhibitor has to pay a fee of admittance of 25 marks, and a rent for the place allowed, viz: Per square meter ground surface within the exhibition premises, 20 marks; per square meter wall surface within the exhibition premises, 10 marks; per square meter ground surface within the arches of the city railroad, 15 marks; per square meter wall surface within the arches of the city railroad, 7.50 marks; per square meter ground surface in open air, 10 marks. The fee of admittance is to be remitted with the application to the secretary above named. Of rent for the place in every instance at least the price for 1 square meter must be paid. Payment of place rent has to be made within four weeks after the allowance of space. This applies also to cases in which the grant ensues at the same time with the acceptance of the application. Only full square meters are given. In case of articles of exhibition for the library neither a fee of admittance nor space rent will be collected. The same applies to drawings and models, inasmuch as they are exhibited by owners of works who do not make it a business to sell or dispose of such.

The managers and the committee reserve to themselves the right to exclude improper objects, and in this case fees and rents paid will be returned. Applications made after July 1, 1888, will be considered only if any vacant space remains.

The exhibition is to be opened early in April, 1889, and is to continue three or four months.

Objects for the exhibition must be forwarded free of cost between the 1st and 15th of March, 1889. All expenses incurred must be paid by the exhibitor. Upon application, tables, cases, etc., will be furnished at net cost by the committee. All articles sent to the exhibition must be removed within eight days after the close of the same.

The committee will secure cheap transportation, freight and custom-house facilities. The result of its endeavors in that direction will be shortly published.

It is further provided that no object exhibited can be removed before the close of the exhibition. Exhibitors may distribute circulars, and sell articles, but not to remove any unless replaced previously by another article of the same make and character. The committee will see to the insurance of articles, but take no other guaranty. Exhibited articles will be carefully guarded, but all other expenses must be paid by exhibitors. Steam power will be provided, and the price for its use published. Awards for eminent achievements are intended. If an exhibitor wants to be treated as *hors de concours* he should so state in making his application. The admission fee for visiting the exhibition will be fixed by the business committee. Exhibitors enjoy free admittance. Reduced rates of admission to the exhibition, as well as railroad fares, will be made for the benefit of working people. A catalogue will be issued, and special terms for the insertion of advertisements in the same will be published.

After the close a complete illustrated report, with a full description of the articles exhibited, is under consideration. It therefore lies in the interest of exhibitors to file, in the library of the exhibition, suitable sketches and descriptions of the articles exhibited.

The plan to arrange an exhibition of this kind originated with the Institute for Brewing ("Vernechs und Lehr-Austalt für Brauerei") in Berlin, which, on the occasion of a general meeting in May, 1887, subjected the question of preventing accidents to laborers to a careful discussion. The Malters and Brewers' Association of Berlin accepted approvingly the project, which at once received additional encouragement on the part of the Imperial Insurance Department, and the Prussian Ministers of Instruction and of Commerce. The exhibition place was offered gratuitously by the Government to the committee constituted; and the press, as well as philanthropists,

directed attention to the project as being particularly appropriate at a time when social-political legislation claimed general attention. A committee, consisting of ten members, was formed, and a guarantee fund of 100,000 marks subscribed. Any surplus produced by the exhibition is to be given to purposes of public good — for instance, for a "permanent exhibition of articles for the prevention of accidents," and for the erection of a hygienic museum.

In view of the circumstance that the plan has been matured only of late and full information was not procurable at an earlier date, doubts may arise whether the Berlin Exhibition, limiting applications to the 1st of July, 1888, will facilitate the participation of manufacturers of the United States. But it suggests itself that an exhibition of this kind, as proposed to be held in Berlin has the merit of a practical step towards solving to some extent the problem of social reform and betterment of the condition of the working classes now occupying the minds of so many of our statesmen and political economists. F. Raine, *Consul-General.*

Berlin, May 4, 1888.

NOTES FROM GERMAN SOURCES.

Referring to an article on the Washington National Library Building, published some time ago by the *American Architect and Building News*, the *Deutsche Bauzeitung* of April 21, says:

Mr. Smithmeyer claims that among recently erected buildings on both hemispheres, none approaches in magnitude his design for a National Library. We would like to call Mr. Smithmeyer's attention to three buildings quite recently completed, of which the one equals his library in size, whilst the other two surpass it very considerably.

The Berlin Technical High School Building, completed but four years ago, covers an area of 111,000 square feet, which is just equal to the Washington Library. The new Hôtel de Ville of Paris, measures, without court-yards, 123,800 square feet, and finally the Palais de Justice, at Brussels, covers a lot of 200,000 square feet (not counting the court-yards), and if you add the projecting terraces and steps leading up to the entrances, this enormous lot is increased to 215,000 square feet, almost double that on which the Library at Washington is to be erected.

The Brussels Palais de Justice, therefore, would seem to be the largest of all edifices of more recent date, unless the permanent stone-and-iron building erected for the Vienna International Exhibition in 1872, covering 323,000 square feet, be accorded that distinction.

Professor Jordan, in the *Vienna Bauindustrie Zeitung*, tells of a chimney-stack near Marseilles, France, which, during a violent gale, showed oscillations which by observing its shadow were found to measure twenty inches. The height of the stack was 115 feet, its outer diameter four feet at the top. After each attack by the force of the gale, the stack was observed to oscillate from four to five times until it came to a halt. Some observations taken in Vienna, by means of a theodolite, showed a stack, 164 feet high and six and one-half feet inside diameter, to move during a high wind six and one-fourth inches. Again, an officer of the Prussian Corps-de-Génie, who had been detailed to make some geodetic observations from the gallery of the St. Ægidius tower, at Hanover, Germany, found himself unable to do any work during a brisk wind, because the tower (being 230 feet high) swung merrily to and fro under the breeze. Professor Jordan concludes by inviting his professional brethren to aid him in collecting observations of a similar nature as throwing light upon the reliability to be placed on towers as points of observation. The matter is besides of importance as regards the stability of buildings of great height.

The King of the Netherlands has placed the portfolio of his most important ministry, that of Waterways, Commerce and Industry, into the hands of Mr. J. P. Havelaar, Chief Engineer of the Canals and Waterways of the province of Drenthe, an excellent and most fitting appointment when it is considered, that Mr. Havelaar brings to his new office not only great technical and administrative ability, but also a familiarity with all the needs of that complex network, the Dutch waterways, obtained through years of diligent work in their service. The estimate for this department, which exceeds those for the war and educational departments, figure as twenty-four million florins in the budget for 1887, equal to ten million dollars.

The reign of the late Emperor William of Germany was a propitious one for the development of architectural art in that country to a remarkable degree. There can hardly be any doubt, but that the historical events which made the German people once more a solid nation, have had a great deal to do with the revival and subsequent prosperity of the arts and industries which we note in Germany during the last twenty years. The national idea sought to take shape in a variety of ways, furnishing poets, musicians, painters, sculptors and architects with tasks grand and splendid enough to satisfy the highest wishes of artists.

Since 1860, when William assumed the regency of Prussia, says the *Wochenblatt für Baukunde*, a number of edifices of the first rank were planned and erected, whilst others commenced earlier were by him carried to a glorious completion. It filled the aged Emperor with proud satisfaction to be present at the opening festivities of the famous Cologne Cathedral, to complete which he had contributed so liberally from his private purse. The project of erecting a grand Protestant Cathedral in his capital was through him advanced by inviting the leading masters of the nations of Europe to an open competition which was largely participated in. It was perhaps the thought that his life might not be spared long enough to carry out this favorite project that caused Emperor William to leave it for his successor to accomplish.

The erection of the German Parliament Building, in whose progress he took a deep interest, we find to be going on with rapidity. It is but a few years since he himself laid the corner-stone for this vast edifice, and already we hear of its masonry being finished in the rough.

Another majestic structure, the Imperial Palace of Justice, at Leipsic, for the Supreme Court of the German Empire, will soon rise above ground.

William unveiled the great National Monument upon the Niederwald erected by a reunited people in memory of the uprising of the nation and glorious victory over the common enemy, France, in 1870.

The grand Column of Victory, on the Koenigsplatz, at Berlin, owes its existence to his initiative. He gave the order for the erection of an imperial palace at the city of Strasburg in Alsace, which is now approaching completion.

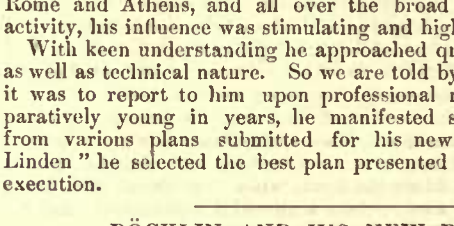
Liberal appropriations were granted under William's reign for the restoration of the old Marienburg Castle in East Prussia, probably the most valuable relic of the Romanesque style of the thirteenth century to be found anywhere, also for the restoration of the Imperial Residence at Goslar, at the foot of the Hartz Mountains, first built in the year of 920, where the emperors of the Saxon and Franconian dynasty held court during two centuries and more.

But his generosity was not limited to works of national glorification; his Government granted still larger sums for enterprises intended to benefit the whole civilized world. We refer to the explorations and excavations the late Emperor had carried on upon the classical soil of Olympia in Greece, and Pergamos in Asia Minor, which, the world knows, have yielded so rich a harvest.

He fostered the German Archæological Institutes established at Rome and Athens, and all over the broad field of architectural activity, his influence was stimulating and highly beneficial.

With keen understanding he approached questions of an artistic, as well as technical nature. So we are told by architects whose duty it was to report to him upon professional matters. When comparatively young in years, he manifested sound judgment when from various plans submitted for his new palace "Unter den Linden" he selected the best plan presented by the best master for execution.

BÖCKLIN AND HIS NEW PICTURE.



Cathedral at Brechin, Scotland.

Böcklin has often before been called the Gabriel Max of landscape painters. Since the "Pietà" has taken its place in the procession of remarkable paintings that wend their slow way through the exhibition-galleries of Europe and the press has been occupied with the artist, the comparison of his work with that of Max is made again. The feeling, as one can discern, is that the talent of both belongs to the same extraordinary morbid type. In the case of the "Pietà," there is also to be reckoned the striking resemblance of treatment of the Virgin's hand with Max's group of wringing, writhed and folded fingers in "Ecce Homo." I incline to think that Böcklin may have had his late young friend's picture in mind when deciding upon this point of the composition. As for the comparison in the main, it is to be remembered while using it that whereas Max selected the horrible in tragic human fate and imbued each personage with intense spiritual life and concentration of passion, Böcklin diffuses the tragic by means of his coloring over the whole scene. The parallel, in

short, lacks significance in proportion as we retire from the habit of conception common to the two artists to the details of their pictorial expression and technical execution.

Böcklin of late years has painted chiefly figures. He possesses enough skill as a draughtsman and modeller when he chooses to exert himself, but his superiority of knowledge lies in the early and favorite direction of his genius. In his landscape paintings, his choice of subject was often felicitous. Nature has her objects of vast dimensions and of historic dignity, her dire and weird aspects. All are fitting themes for morbid fancy, fitting, too, for the supernatural in Böcklin's tone of coloring. This light-transfused, moisture-laden blue is a blue for out-of-doors, a blue of which Goethe would say, "it conveys a feeling of coolness, it has a singular and inexpressible influence, it attracts us strangely, not by intruding upon our sight, but by drawing us after itself." [1]

What a satisfactory piece is his "Ruined Castle by the Sea!" and I think of that other, "The Shrine of Hercules," where three pirate warriors are represented as come upon a holy shrine, on a bright night, near the sea. One stands out upon the rocks on guard; the two others creep round the encircling high wall to the edge of the opening and sink on their knees to mutter their quick prayers. A tree, that to have attained such dimensions in a spot like this must be of an untold age, grows within the enclosure and stands out a solid mass against the night sky, while flowers are discerned hanging over the wall. If here the red of the cappa of the warrior on the watch is a bit of color flung, as we know, with a mere artistic purpose against the shimmering blue of the salt water, we forgive it, for we are easily done with it. We turn from the shrine and the warriors kneeling in superstitious fear to the stiff, archaic figure on its high pedestal, a figure that is lost, as we feel are the sentiments of these men of blood, in funest and shadowy maze. A suggestion of solitude and vastness is in the scene, without any attempt having been made by the artist to depict extent and emptiness, while the human emotion natural in such surroundings is embodied by a choice of means that is direct and highly satisfying. We are free from the suspicion upon looking at these canvasses of having to do with a self-opinionated artist. We can think instead that originality has enriched, not only the schools by proofs of latent power and astonishing technical mastery, but Nature herself, by an unaffected interpretation of an earnest mood.

In the "Pietà," a division is made of the composition into an upper and lower portion. The latter contains the figures of the crucified Christ and Virgin Mary. The lifeless body lies stretched out in stiff lines upon a marble tomb. The whole is bathed in the blue grotto-like tone which Böcklin loves to employ, while a blending white light streams through a suspended cloud. The upper portion is filled by a group of consoling angels. Such is the composition. So far nothing is discomforting. The corpse of Jesus is realistic, but the old masters have accustomed us to realism in this theme, as well as to the division of pictures into upper and lower portions. Where our composure and traditional opinions are startled is at the fact that nothing of the Virgin besides the wide dark-blue mantle that envelopes her and *one* hand is visible. By degrees the prostrated form grows distinct, together with the whole wonderfulness of the tender, white, delicately-veined hand pulsating with violently-agitated blood. It furnishes a touching, almost an overwhelming contrast to the rigidness of the dead body on which it lies.

We have here, no doubt, the *tour de force* of the painting. The lowermost angels are beautiful. They are painted moreover carefully, whereas the remaining ones are depicted with sketchy hastiness. The flowers that adorn the tomb, while overspread with the blue glow that fills the place, retain a splendid richness of native color. Böcklin is not only a master in glazing of the true Munich type; he also employs, it is said, certain secrets, that he has discovered of encaustic painting. Perhaps they were here put in use; it was impossible to get near enough the canvas for inspection. The whole, as well as particular parts, conveyed the impression of unmistakable power. But in this instance it is a power which impresses us more than it delights. COUNTESS V. KROCKOW.

NOTES & CLIPPINGS

FIRE RISKS OF ELECTRIC LIGHTING.— M. Mascart recently performed before the French Physical Society a number of experiments illustrating the possible dangers of fire from electric light. In introducing the subject, he stated that it was necessary in electric-light installations to take precautions against the undue heating of the conductors, and to avoid the risk of materials being ignited by the heat generated in the lamps. In the case of insulated wires laid beneath mouldings, the heat generated was generally dissipated by conduction which kept down the temperature of the wire and its covering. But an excessive current might destroy the insulation and inflame the wood. An experiment was made with a wire of 1.2 mm. in diameter, laid on a block of wood and covered with another block. This wire would, in ordinary practice, carry a current of 4 ampères, but in this experiment a current of 40 ampères was passed before it commenced to carbonize the wood. With a much greater current the wood was inflamed at a point where the wire was uncovered, as between the boards the lack of air prevented ignition. In order to see what amount of danger was to be expected from the lamps themselves the following experiments were made: 1. The globe of an arc lamp was covered with several thicknesses of a light fabric of green tarlatan. 2. A glow lamp of 32 candle-power was covered in a similar manner, the folds of the fabric being pressed on the lamp by an India-rubber band. 3. An incandescent lamp was covered with a cotton hood. 4. A glow lamp was covered with a similar hood of black silk, which was surrounded by another of velvet. 5. A lamp was covered with a layer of white wadding, the gummed surface of which had been removed. 6. Two glow lamps were covered with layers of wadding, white in one case and black in the other. 7. A lamp of 32 candle-power was placed in a vertical fold of an old theatrical scene; and finally, 8. A lamp of 300 candle-power was laid on a similar scene. In cases 1, 2, 5, and 7 no carbonization nor excessive heating was caused for twenty minutes. In case 8, the scene commenced to carbonize without flame at the end of 1 1-2 minutes, and at the end of 2 minutes the envelope of the lamp in 5 burst into flame, and in about 6 minutes the velvet calotte in experiment 4 commenced to burn slowly; this experiment was prolonged without breaking the lamp, but the globe was deformed. The cotton hood in 3 was partially carbonized at the end of 10 minutes, but was not set on fire.—*Engineering.*

A CASE OF TRESPASS.— William and Ferdinand Setzke are cousins and are the respective owners of adjoining lots at Thirty-first and Fox Sts. Some years ago Ferdinand built a house on his lot, which encroached two feet and two inches upon his cousin's land. William verified this by a survey of the land after he and his cousin had had a falling out, and at once instituted suit for possession of the strip pre-empted by Ferdinand. He recovered judgment for possession and refused to compromise except by getting his land. The case was fought bitterly. The Supreme Court decided that William was entitled to his land and an order was entered directing the issue of a writ of possession. The writ was issued, but Sheriff Matson failed to execute it, and William secured a rule by Judge Baker to show cause why he should not be attached for contempt of court. The sheriff answered the rule by saying it was impossible for him to execute the writ without tearing down a portion of the house built by Ferdinand Setzke, or trespassing on his property. While it was admitted by the sheriff's attorneys that the plaintiff was entitled to undisturbed possession of as much of the defendant's building as encroached upon his land, the trouble seemed how to get there. The door of Ferdinand's house was on his own land, and the sheriff had no right to go through it without the owner's permission, which he could not get. If he entered the door, Ferdinand could legally defend his own property, and if need be shoot the officers, and the sheriff did not think the court would require him to take his life in his hand and make him attempt to enter the premises. The court cited a case in New York, where one man infringed upon another's land by building a brick wall an inch and three-quarters over the line. The other man secured a judgment for possession, but the trespasser coolly told the sheriff to go and take an inch and three-quarters from the brick wall, but defied him to trespass another eighth, or even a sixteenth of an inch. "The defendant," said Judge Baker, "has the right to live in that part of his house which does not rest upon the plaintiff's land, and to live there his allotted three-score years and ten, but the plaintiff certainly has the right to do what he pleases with the portion of the building on his land. He may saw off two feet and two inches, provided he stays on his own land and does not trespass on the other's land; or he may cut a hole in the side of the house and enter upon so much of the premises as is built upon his land. You may hold that this would be a trespass, but I hold that it would not be, if he does not infringe on the defendant's property. The demurer of the sherriff is overruled." —*New York Tribune.*

ARTISTS SHOULD DISCARD TURPENTINE.—About a dozen years ago the collected works of Landseer were exhibited in London. I was shocked on observing that some of his finest works were miserably faded. This was notably the case with "The Sanctuary," a picture of a red deer that had just crossed a lake and was emerging with the water dripping from its fur. When this was first exhibited at the Academy I admired, among other details, the sparkling brilliancy of the water drops, and the general suggestion of cool freshness throughout the picture. At the later exhibition all this had gone. In naming this I am not selecting an exception, but a typical example of the early fate of the pictures of the majority of modern artists; some become faded, others wrinkled and reticulated with a network of cracks, even during the lifetime of the painter, while the works of the old masters remain with very little decay during many generations. My opinion is that the turpentine of the medium is the chief offender, and that the true artist should discard it altogether as fitted only for the work of the house painter, of whom rapid drying and flatting are demanded. Careful examination of the surface of the works of the older of the old masters has led me to doubt whether they used turpentine at all, and to conclude that their medium was linseed oil pure and simple, used so freely that the drying of their pictures must have demanded days or weeks and a studio free from dust. With such a medium every individual particle of the pigment matter is enveloped and sealed in a curiously imperishable transparent skin, which dries by gaining something, namely, oxygen, and therefore swells a little in thus drying, thereby compacting itself and embracing more firmly with loving æsthetic hug the precious color particles that constitute by their arrangement the artist's pleasure-giving legacy to his fellow-creatures. Not so the turpentine-diluted medium. In this case half of the medium evaporates, leaving the poor particles of pigment half naked to their enemies. Some painters have mixed varnishes, such as copal or mastic, with the oil medium, or have even used these as the sole medium. The result of this is peculiarly disastrous, especially if the color is laid on thickly, as is likely with such a viscous and quick-drying medium. As the solvent of the varnish evaporates the whole contracts and leaves a network of cracks or wrinkles, practically destroying the picture.—*W. Matthieu Williams, in the Gentleman's Magazine.*

GROWTH OF NATURAL GAS BUSINESS.— Some idea of the extent of the use of natural gas in Pittsburgh, Allegheny and vicinity, and the

[1] *Zur Farbenlehre.*

profits of the business, may be had from the report of one of the companies just presented. It states that on February 29 the last of the treasury-stock had been sold, so that the entire capital stock of $7,500,000 is now subject to dividends. Rents, operating expenses, interest and taxes for the year amounted to 46.65 per cent of the earnings, or $1,709,702.74. Monthly dividends of 1 per cent, amounting to $842,626.50, have been paid. The number of house-connections made from the lines of the company during the year 1887 was 4,612. A year ago the company contracted to operate the lines of two other companies. The united business of these three companies amounted on March 1 to the supplying of 678 manufactories and 11,955 dwelling-houses, and, through other distributing companies, the supplying of 113 factories and 10,961 dwellings, or a total of 23,707 contracts. — *N. Y. Commercial Advertiser.*

Effect of Ammonia on Animal Life. — An explosion of an ammonia tank occurred May 6, at the Buckeye Brewery with a very strange result. Almost immediately after the explosion every bird in the neighborhood fell dead. Chippies, English sparrows, and canaries all suffered alike, and after the shock dead birds could be seen lying about the sidewalks in that locality in great numbers. The explosion caused an alarm of fire to be sent in, and the horse attached to the Hose Reel No. 5, which responded, came near being killed by the ammonia. The animal dashed towards the supposed fire with all the speed he possessed, but when the strong odor of the ammonia struck his nostrils he was completely overcome and could not move. The horse was at once withdrawn from the place and restoratives applied. John Loder, George Kotts, Laborers, and Fireman Ross were in the room at the time, but escaped uninjured. Besides the injury done to the tank the company will lose $500, the value of the ammonia.— *Cincinnati Enquirer.*

A Sagacious English Workman. — There is a good deal of the much esteemed "get there" quality in your genuine Englishman. His methods are sometimes crude, but he sticks to it and "gets there." A good many years ago a gentleman whose name stands at the head of the largest wire manufacturing establishment in the world — it was a very modest concern then — went to England and bought some steel rods to be shipped to this country and drawn into wire. A workman there saw them, and made up his mind that wherever they were going there was work for him. He asked no questions, but made up his mind to follow the rods. He saw them loaded on freight cars in Birmingham, made friends with the train-hands and accompanied them to Liverpool. He saw them unloaded at the dock there and kept his eye on them. He saw them put aboard ship, and took passage for America in that vessel. He saw them landed in Boston, and again kept his eye on them until they were again put on freight cars. Again he followed them till they reached their destination, presented himself to those who received them, told his story, got a job and kept it until a year or so ago, when he died, leaving sons behind him who are employed in the same establishment. He knew enough to "follow the rods" and ask no questions and he "got there." — *Boston Herald.*

London Theatres in the Sixteenth Century. — Dr. Gädertz of the Royal Library, Berlin, has found a valuable manuscript and drawing relating to a theatre of Shakespeare's time. Although drawings of the exteriors of several ancient London theatres have been preserved, the oldest representation of the interior of such a theatre is that of the Red Bull, dated 1672, and therefore not belonging to Shakespeare's epoch. The date of the original papers which Dr. Gädertz has fortunately discovered is 1596, and they contain important news concerning the old English stage, especially the Swan Theatre. A learned Dutchman, John de Witt, Canon of St. Mary's Church in Utrecht, visited London in 1597, and noted many remarkable sights, and he describes Westminister Abbey, St. Paul's Cathedral, and other buildings. But the most curious of his reports is that on the theatres. There were four large and splendid play-houses in London about 1596, the Theatre and the Curtain, towards the north, the Rose and the Swan. We learn that each of these was an oval, beautiful structure, not of wood, but built or faced with flint and marble, and of considerable size, the boxes and galleries containing 3,000 seats. John de Witt's sketch is also highly interesting, and neatly drawn. We see the actors on the stage, in the costume of Queen Elizabeth's age, the audience, the "lords' rooms," the doors, and the "tiring-house" in the background. Dr. Gädertz has just published de Witt's documents and drawing. His book, entitled "The Old English Stage, and other Shakespearian Essays" (Bremen, Müller), with two illustrations, will undoubtedly create some excitement in the literary world. — *London Times.*

Pile Dwellings in Africa. — "In the Kedebu country," says Emin Pasha, in his journal, "we come upon the pile-dwellings. A platform supported upon over 300 stout piles, each one six feet high, stood within a broken-down bamboo fence. It had a length of ninety feet, a width of eighty feet, and was made of timber and brushwood, and covered with clay and cow-dung, to form a level flooring. The ground-floor among the piles serves as a kitchen and storehouse; the water-jars and the *murhakka* (grindstone) are placed in it, and the servants sleep there. A square hole in the centre of the platform provides this lower room with light, and ladders lead through the hole to the platform. This latter is divided by a reed fence into an outer and inner compartment, the former containing two large huts, each about fifteen feet in diameter, with neat mud walls about three feet high, and a lofty conical roof. These two huts serve as a dwelling-place for the master of the house. The inner compartment, or harem, contains six smaller huts. The whole arrangement is really curious, especially here, where the ground is not swampy, and where termites [white ants] are only seldom found, so that there appears to be no real reason for such a method of house-building." Around each homestead is a garden, in which are grown maize, onions, beans, egg-apples, banannas, lemons, bitter oranges, etc. — *Chambers's Journal.*

Canopy for Washington. — Greenough's colossal statue of Washington being injured by exposure to the weather, the Senate adopted on May 7, a resolution directing the Library Committee to inquire into the expediency of moving it from its present location, just east of the Capitol, to some other place in the grounds, and of having it protected by a canopy. This statue was purchased in 1832 at an expense of $20,000, and the total cost of its several removals, including the original transportation from Italy, was $29,000.

Discovery of Roman Statues. — Three statues of Roman art were discovered and seized yesterday; one of the Emperor Hadrian, another of Antoninus, and the third a small Bacchus. All three are well preserved, and of excellent workmanship. — *London Daily News.*

TRADE SURVEYS

Competition is still straining every nerve in manufacturing and trade circles, and according to commercial reports, from twenty to thirty traders are daily being crowded down or out. This competition has received considerable momentum since the opening of spring, and at this time it is moving with a force which no possible combination can arrest. Under no conditions could legislation accomplish what competition is now doing, and it is probable that when the force of the present movement is exhausted, there will be much less occasion or need of National or State legislation to protect the interests of the general body of consumers. Business is as active as could be expected under the circumstances, but still it hangs about ten per cent below the corresponding weeks of last year. Restriction is the rule in all channels of trade; manufacturers are providing only for actual present or well-calculated requirements. No matter what line of trade is taken, we find the same circumspection and conservatism. Accumulations of stock are carefully avoided; indebtedness is avoided, and credits are guarded as carefully as possible. In fact, a more conservative business is now being done than ever before. Manufacturers, financiers and the controllers of business generally are taking a long and careful look into future probabilities, and acting in such a way as to save themselves from complications, no matter what turn affairs may take. All the iron and steel manufacturers, it appears, have resolved to ask their workmen to consent to a ten per cent reduction in wages; if this request is persisted in, it will probably lead to a strike which may last three or four months unless the employers surrender. The iron and steel workers have the strongest combination in the United States, but it is not so strong but that it may be defeated. It has stubbornly and successfully resisted any reduction in the rate of wages for several years, but now there seems to be good reason for a reduction, and if they oppose it, they will be on the wrong side. The Eastern and Western nail-makers have united upon a classification which will prevent friction and result in greater harmony. The steel manufacturers have also harmonized and are acting together. In the various branches of the iron trade there is more harmony than formerly, but, at the same time, greater competition than ever. The steel-rail makers have lowered their prices to thirty dollars, and it is now rumored that less money will be taken before the close of the month if orders can be had. The coal production is ahead of last year's output, and in the anthracite trade producers are maintaining prices at a high point. In the bituminous regions more mines are being opened, and preparations are being made for a considerable increase in production next year. The car-builders throughout the country are still loaded up with orders and have their capacity engaged for a long time ahead. There is great activity among the locomotive-builders and in all the ship and boat yards of the country. In the boat-yards along the Lakes, a great deal of craft is being contracted for on account of the business developed from the operation of the Long and Short Haul clause of the Inter-State Commerce Law. Domestic exchanges are steadily increasing and the volume of business done at interior points is growing more rapidly than along the Atlantic Coast. That is to say, Boston, New York, Philadelphia and Baltimore are losing relatively as to Chicago, Cincinnati, St. Louis, Kansas City, and two or three other Western points. The great Mississippi Valley is rapidly filling up with a thrifty population, and from the diversification of industries going on, it is creating great commercial centres throughout the interior, which promise in time to rival those of the Atlantic Coast. The architects and builders throughout the West report a little falling off in building activity. The chief activity is in the direction of small house building in cities and towns. A great deal of work of this kind will be done during the fall. In fact, the probabilities are that next year, no matter what else may happen, an immense amount of building in the way of small houses will be undertaken. The capitalists and manufacturers who have entered into this work as an experiment have been greatly pleased at their success and the returns and will enter upon still larger schemes for house construction next year unless a serious setback should be given to general business. The lumber trade is slackening up throughout the New England and Middle States, but maintains itself well throughout the far West and in the South. The textile capacity throughout the East is fairly employed, but taking the industry as a whole, North and South, there is not as much activity as last year, nor are the margins as encouraging to new concerns. The Southern textile interests are under excellent management and generally have abundant capital behind them and are able and evidently willing to stand any reasonable amount of discouragement which competition may develop. All of the smaller industries are struggling along under healthful conditions. Narrowing margins are making it necessary to invest capital in larger blocks than years ago; yet there are better opportunities to-day than ever before in the history of the country for persons of small capital, provided they are wise in their selection of a location and the particular avenues upon which they enter. The glass-makers everywhere are busy. The makers of brick are oversold, excepting in New York and New Jersey. Manufacturers of building material generally are busy, with a fair prospect of employment throughout the year. The builders of machinery have nearly as much business as twelve months ago and in some directions more. A large amount of engineering machinery and appliances will be contracted for this fall. Should the railroad-builders conclude, late in the fall, to renew railroad building on a large scale next spring, which some financiers think they will do, it will result in the placing of a large number of orders for the winter, which, in turn, will stimulate business in all directions and help the iron trade out of the slough into which it has gradually slipped.

S. J. Parkhill & Co., Printers, Boston.

THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. XXIII. Copyright, 1888, by TICKNOR & COMPANY, Boston, Mass. No. 652.

JUNE 23, 1888.

Entered at the Post-Office at Boston as second-class matter.

CONTENTS.

A WELL-KNOWN New York architect, Mr. Charles W. Romeyn, recently had trouble in collecting his bill from an eccentric client, whom he was finally obliged to summon before the courts. The bill was for professional services in preparing plans for altering the country house of the defendant, who spends his winters in Paris, and his summers on an estate, comprising some five hundred acres, near the Hudson River. The alterations were designed to make the house resemble Speke Hall, a celebrated noble mansion in England, and among the other incidentals to the establishment was a dog-kennel which cost fifteen hundred dollars. After the plans were made, Mr. Romeyn sent in a bill amounting to seventeen hundred and twenty dollars. His client, who is a German, refused to pay it, on the ground that it was excessive, and deputed his wife to represent him in court. The lady testified to the services rendered, concluding with some rather singular answers to still more singular questions propounded by the plaintiff's counsel; and the jury promptly brought in a verdict in favor of the architect, for the full amount claimed, with interest and costs.

MR. HAROLD P. BROWN, an electrical engineer, writes to the New York *Evening Post* a long and sensible letter about dangerous electric wires. The occasion of the letter seems to have been the death, within a short time, of three citizens from accidental contact with wires used for electric-lighting, and the writer gives an interesting description of the different sorts of current employed, with the peculiar dangers of each, and of the defects of the wire ordinarily used for conveying the current. As most architects know, the sorts of insulated wire now employed for supplying electric-lights may be reduced to two, the best being of copper wire buried in a black, resinous paste, and protected by a braided covering of black cotton thread, while the commonest is covered with white cotton thread, braided on, with, it is said, a layer of asbestos between it and the copper, and painted on top of the cotton. This is known as "underwriters' wire," from the fact that it is usually accepted as safe by the insurance companies, but, according to Mr. Brown, the line-men indicate their opinion of its safety by calling it commonly among themselves "undertakers' wire." This "underwriters' wire," while reasonably serviceable under cover, soon loses its insultation, as Mr. Brown says, when exposed to the weather. The paint dries and burns away, the cotton is loosened by ice, or by contact with other objects, and soon hangs from it in shreds, leaving the exposed metallic surface of the wire free to transmit its deadly stroke through any object which may come between it and the ground. As scores of "tramp-wires," owned or cared for by nobody, hang loose over the streets and roofs of all our large cities, there is almost always a medium at hand by which the flash from an exposed electric-light wire can be conveyed to some telephone wire, or near enough to the ground to come in contact, at the proper moment, with a victim.

IT seems, however, that the sort of current passing through the wires is quite as important, in regard to the danger from them, as the condition of their insultation. Most people have heard a good deal recently about the system of alternating currents, which is said to have so great advantages in point of economy that a combination has been formed to unite all the patents for electric-lighting in which this system is employed. Mr. Brown, however, informs us that alternating currents are terribly dangerous; that the renowned firm of Siemens & Halske, after years of experiment with them, have entirely abandoned the system, as too hazardous for use, saying that it should be proscribed by law; and that the Board of Electrical Control of Chicago has already forbidden its introduction into that city. Next to alternating currents, those which are made to pulsate by the use of "open-circuit armatures" on the dynamo are most dangerous. According to Mr. Brown, the succession of shocks from a current of this kind, which are produced at the rate of several thousand a minute, is much more fatal than the passage through the body of a continuous current of the same intensity; and he says that within his knowledge only four deaths have ever occurred from wires belonging to electric-lighting companies employing continuous currents, while the victims of wires conveying pulsating currents, which are used by two important companies, "are counted by scores." Moreover, as he tells us, there is no great difference in the danger between arc and incandescent lighting systems employing currents of this kind. It is well known that the current used in the Edison system for incandescent lights is quite harmless, and we have seen an amateur separate two portions of a conductor supplying four hundred lamps, and allow the whole current to pass through his body, without inconvenience; but this, Mr. Brown says, is the result, not alone of its low tension, but of its steadiness; and the currents supplying incandescent lights on some of the other systems, which, it must be remembered, often supply arc-lights at the same time, may be among the most dangerous of all. So far, architects are hardly expected to be experts in the new science of electricity, as well as in all the older sciences, but all of them like to learn, and a knowledge of the character of various systems, sufficient to warn them against the dangerous ones, would be a useful acquirement, to their clients as well as to themselves.

IT seems to us that it is quite time for some improvement to be made in the material, if not the design, of house hardware. In all the other arts alloys are now employed which possess a tenacity, and unchangeable brilliancy, of color apparently unknown to the manufacturer of builder's hardware, while non-metallic materials, beautiful and well fitted for the purpose, might be found without great effort. One of the pleasantest materials to the touch, for such objects as door-knobs, is celluloid, which is, it is true, employed for them, but, so far as we know, only in the form of a thin film, held to the metallic knob which forms its foundation by a band of brass, encircling the middle of the knob, and subject to an ugly discoloration which soon spoils the beauty of the knob. Many years ago an extremely pretty knob was in use in England, consisting of an ivory-like composition, formed with twelve or fifteen smooth lobes, like a mango, and showing only a small metallic rosette in front, which served as a sort of head to the spindle, and, not being touched by the hand in opening and closing the door, preserved its polish for a long time. A knob of this kind could be made in ivory-colored celluloid, as it already has been in red and black vulcanized rubber, which would be admirably suited to the ivory-white and gold decoration which is yet fashionable; and if the metallic rosette in the

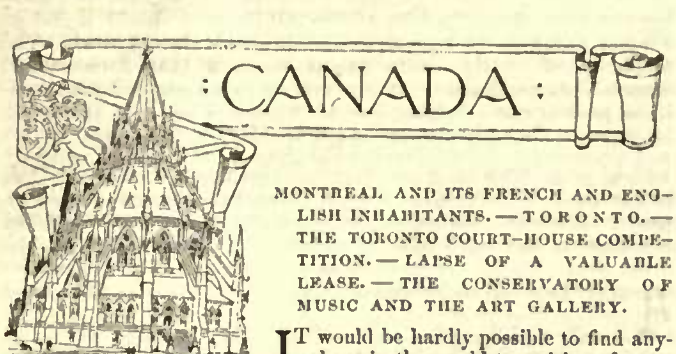
centre were retained, as it probably would be, on account of its richness of effect, it might be made of aluminium bronze, which would never tarnish.

THE same alloy might with very great advantage be used for other metallic objects. As now made, the brass hardware, which is sold in many very pretty patterns in imitation of the work of the last century, is extremely troublesome to the housekeeper. For exhibition in the shops, it is gilt, and keeps its lustre so long as it is not handled; but the film is very thin, and by the time the house with its hardware comes into the owner's hands, the gold has disappeared in patches, and the "colonial" knobs present a parti-colored aspect, very unsuitable to a fine new mansion, until the gold has so far gone that the housekeeper makes up her mind to remove it entirely; and thenceforth the neatness of the knobs, hinges and other metal furniture is dependent upon daily rubbing with rotten-stone or "putz-pomade," which quickly soils the paint about them. At the enormous prices charged for the fashionable brass hardware, aluminium bronze could probably be used at a profit, and would never change its color or lustre, while this quality would adapt it for use in delicate designs, which are unsuitable to any metal dependent for its beauty upon daily polishing. Where a more sober color is desirable, use might, we should think, be made of the "steel bronzes," made, as we understand, by subjecting brass to the action of antimony, and, although this finish would hardly be durable upon door knobs, it seems to be permanent enough for hinges and escutcheons. It would appear, also, to be quite possible that some form of Spence's metal might be used for knobs. This compound of various metals with sulphur, although it might be brittle, could hardly be more so than the glass shells often used, while, as it is said to have the property of expanding in cooling, it ought to give very sharp casts, producing, with good moulds, handsome work at a low price. For the richest class of houses something might certainly be devised more interesting in the way of metal-work than the cast brass or bronze, in patterns of questionable elegance, roughly finished on a wheel, and touched up with black enamel. Under the direction of an accomplished architect these objects should contribute in a considerable degree to the sentiment of high-bred courtesy which a great mansion ought to express. Imagine, for instance, a knob of aluminium bronze, with, as we have seen, a beautiful monogram, or the crest of the owner, in the centre, and, perhaps, around the rim a circlet of moon-stones, or cats-eyes, or spar, or any other of the multitude of semi-precious stones at the service of the designer, cut *en cabochon*, and set with some pretty chasing to give preciousness to the rim which is to be honored by the touch of one's guests' fingers. Such door-handles as these, or, let us say, knobs of carved ivory, enriched, perhaps, with garnets set in little gold rosettes, would not seem too costly to people who can spend forty thousand dollars on a single piece of furniture, or five thousand dollars a pair for lace curtains for the parlor windows, or who set their dinner tables with complete services of solid gold, as several New York families are said to do now; and they might be made to convey, what gold soup-plates do not, that expression of delicate hospitality, of the endeavor of wealth to interest and please its guests, rather than to dazzle and humiliate them, which is every day becoming better understood among us.

THE *Wiener Bauindustrie Zeitung* gives us some information in regard to ancient tunnels, which will be new to most readers. The most remarkable tunnel of antiquity which is still serviceable is the one known as the Tunnel of Posilippo, or Grotto of Puteoli, by which the highway from Naples to Capua passes for a distance of thirty-nine hundred feet, or nearly four-fifths of a mile, under the volcanic hill of Posilippo. This extraordinary work was completed in the year 27 B. C., and was connected with the great network of Neapolitan highways by Marcus Agrippa, the Minister of Public Works to Augustus Cæsar. Knowing, as we do, how little use the Romans could have made of instruments of precision such as we possess, it is rather surprising to find that the Posilippo tunnel was built on what we call the modern system, by sinking a shaft in the middle and working each way from this, as well as from each end, making four headings at once in operation. It was long supposed that the central shaft was sunk, for some unknown purpose, by King Alfonso I, in the fifteenth century, but this idea seems to have had no foundation except in the assumption that the Romans were not sufficiently scientific engineers to think of working a tunnel from a central shaft, which is sufficiently disproved by the fact that three other tunnels, unquestionably of Roman workmanship, have been discovered in the neighborhood of Naples, every one of which was driven from a central shaft, as well as from the ends. The great Posilippo work, which was, of course, cut entirely by hand, was admirably lined and supported, and has been open continuously for traffic for nineteen hundred years, without showing any signs of deterioration.

ANOTHER antique tunnel which has been recently explored is that at Samos, which is described in Herodotus as having been a mile long, and as being used as a conduit to bring water to the city. For centuries this account of the Greek historian, who, it must be confessed, is a little given to startling stories, was discredited, but in 1882, the superior of a convent in the neighborhood, in removing some stones, discovered the entrance to the tunnel, and a German expedition was sent to explore it. The work was thoroughly done, and resulted in the tracing of a covered conduit, about three-quarters of a mile long, portions of which, however, were deep cuttings, covered with a barrel vault, while the rest was drilled through hard limestone rock. The longest continuous rock-tunnel measured twelve hundred and thirty-five feet, and was driven from each end, without a central shaft. Near the city end of the tunnel branches were taken off on each side, for the better distribution of the water to the different quarters of the town, and remains of a huge covered reservoir were found at the upper end of the conduit. This surprising piece of ancient Greek engineering seems to date from the reign of Polycrates, the period of the greatest prosperity of Samos, about 530 B. C., fifty years before Asia Minor was ruined by the hordes of Persian soldiers, who came, driven by whips in the hands of their officers, to cover with their flint arrow-heads the battle-fields of Marathon and Thermopylæ.

M. MARCEL DALY gives us, in *La Semaine des Constructeurs*, some archæological statistics of a novel kind, gathered from his examination of the interesting collection of objects discovered by M. and Mme. Dieulafoy in the mounds which cover the ruins of the ancient city of Susa, and now arranged in the Louvre. The city, as their investigations have shown, occupied both sides of the river Choaspes, near its confluence with the Tigris. On one side was situated the winter palace of the Persian kings, with its enclosures and subsidiary buildings, including temples and fortifications, while the other bank of the river was occupied by the populous quarters of the town. M. Dieulafoy's expedition attacked the royal quarter only. On this side of the river are several mounds, occupying an area of about three hundred acres, and containing, as estimated by the engineer of the party, about fifteen million large loads of débris. Of this the expedition removed in three years forty-two thousand loads, or about one-fourth of one per cent, and recovered and brought home fifty tons of antiquities, at a total cost of less than eleven thousand dollars, or about nine cents a pound. Now, taking large and small objects of ancient Persian art together, it must be admitted that nine cents a pound, delivered in Paris, is a low price; and if the remainder of the débris should yield as rich a return as the first portion, which seems altogether probable, the tumuli of the royal quarter at Susa still contain, at the same price, more than four million dollars' worth of valuables, easily reached, and ready for immediate sale. Whether the market would be overstocked if the whole amount should be thrown upon it at once is not, perhaps, certain, but it must be remembered that the United States offers to the collectors of antiquities of real value a rich and very intelligent public, possessed of imagination enough to take great pleasure in interesting curiosities, and almost destitute of museums where such curiosities can be studied without expense. We remember being accosted once, in some public place, by a bright-looking countryman, who wished to inquire into the history of the editorial scarf-pin, which, as he said, "looked as if it might be old," and the exhibition of the Greek coin out of which it was made drew an interested crowd to examine the first work of human hands counting its age by centuries which most them had ever seen. Such people as these would absorb a large amount of archæological material, with much benefit to themselves, and corresponding encouragement to the devoted persons who are willing to spend their time in digging for it.



CANADA

MONTREAL AND ITS FRENCH AND ENGLISH INHABITANTS. — TORONTO. — THE TORONTO COURT-HOUSE COMPETITION. — LAPSE OF A VALUABLE LEASE. — THE CONSERVATORY OF MUSIC AND THE ART GALLERY.

IT would be hardly possible to find anywhere in the world two cities of comparatively modern dates of foundation more unlike than Montreal and Toronto, in the same country, under the same government. The nationalities of their populations and their characteristics, the Provincial Governments, and the very laws of the two provinces in which they are situated are as unlike as they can well be. Toronto is decidedly English, while in Montreal the French population numbers more than half as many again as the English. As an inland city, Montreal has advantages such as no other city in the world can boast. At a distance of 700 miles from the seaboard, the ocean steamers, passenger and merchantmen, come into the heart of the country to discharge and take on their cargoes. The rapids just above Montreal prevent their farther progress. Toronto has its water communication with Montreal one way, with the States and the north-west of Canada the other.

"A Day in Montreal" appeared in this journal at the end of last year, written, no doubt, by some one very tired with his journey to that place, and with spirits very much damped by the weather he experienced. He took a most dismal view of things generally, and described what he saw through rain and "the blues" to be such as few residents find Montreal to be. It is anything but a dreary place to live in, and is really very interesting. Its foundation dates from 300 years ago when the Sulpician monks pitched their tents, or made their huts of branches and brambles, in that particular square of land which is still owned by them, and in which stands the Roman Catholic parish church. Montreal was the base of operations for the fur trade between Canada and Europe, and the round towers still standing witness to the defense of settlers against the Indians. It was from Montreal that the ever famous La Salle started on his discoveries of Central North America, and it formed for years the link between civilization and the savagery of unknown America. Geologically it is interesting, for in its comparatively small area are to be found all kinds of soils, from the hardest of rocks, the firmest of sands, to the worst of shifting blue clays. It is interesting from its beautiful "mountain," (a *hill* of 800 feet to the eyes of all but Montrealers) very luxuriant in trees and shrubs, the summit commanding a most extensive views to all points of the compass. Its one drawback, great and almost overwhelming, is its Frenchiness. French in tongue, French in its inaction and content with things as they are. The French population have no ideas of progress, and fatally impede the English. As to its opportunities of being a beautiful city architecturally there can be no doubt. There has been no lack of the "needful" when churches were required and business and private buildings were to be erected, but there has been and still is a very sad deficiency in the conception of the beautiful in the art of architecture. Mark Twain says of Montreal that he could not throw a stone without breaking a church window; and certainly one meets a church at every corner, and passes others in the streets, or, if not actually churches, religious establishments of one kind or another. As a general rule the warehouses and business blocks are poor in the extreme, although by degrees they are being improved. The principal banks are large and heavy buildings, which would seem to endeavor to impress on the public mind the dignity of money and the solemnity of money transactions; its temples must be entered with a due sense of submissive awe. The principal street has for some time been looking very dismal and desolate from the ravages of fire. Four large buildings in as many hundred yards in ruins, blackened and half pulled down make a stranger ask if there is such a thing as a fire-brigade, and suggest it would be well to get one. To be sure, there is one, but until the very recent change in its organization it was almost worse than useless. Montreal has several open squares planted with trees and turfed, giving a foreign appearance, but adding a beauty to the city.

Toronto, as has been said, is English, and decidedly so. English in its bull-dog fashion of slowly but surely making its way, and it bids fair to become the chief city of the Dominion. Not having so old a foundation as Montreal, and therefore forming its character and habits by degrees instead of having to alter and change those of former generations to suit the spirit of the age, there are fewer impediments to its improvement. It is "going ahead" at a great pace now, and several large and important buildings have been begun this year. One in particular, because the history of its conception is so diverting and instructive, shall be described more particularly. This is the new Court-house and City-hall, which competition adds another case of the abominable treatment of the profession by corporations. Perhaps there has been no case in which architects were worse treated. In the year 1884 the competition was advertised, and regulations and lists of requirements were sent to inquiring architects. These were drawn up by an architect who for years has been practising in the city, and contained, among other items, a list of the various rooms, courts, vaults, etc., required, with the necessary superficial area for each. Designs were sent in, and nothing more was heard for some time. At last *all the designs were thrown out* on the plea that the only ones in any way suitable could not be carried out for the stipulated sum, but no one was allowed to prove his estimate. No premiums, therefore, were awarded, and for a time the matter stopped, although a slight attempt was made to unite the competing men in action against the corporation, and to force them to award the premiums, but nothing came of it. The special committee of the corporation, finding they had come out of the matter with whole skins, and had not spent a cent, thought they would go in for another competition, but their consulting architect before mentioned threw them over, and would not countenance their dealings. Finally the matter was put into the hands of an architect who had carried out works for the then mayor previous to this competition. But the city council, having conceived in bad faith, was destined to suffer considerable labor-pains, and it will be years before the Court-house and City-hall is brought to the birth. It transpired that the accommodation required in the first place was considered to be too great, and because of this they thought they were justified in throwing out the designs, or, in other words, because they had changed their minds, they would not give premiums promised for what they did not now want. Tenders were asked for and received, opened before the committee, when behold they totted up to very much higher than the ultimate figure, and these without tenders for heating and such things, which, as the architect remarked, would be well to leave for the present, as it would be three years before they were necessary, and by that time there might be considerable improvements upon present systems. The work must be cut down, and the prices, too. Then the worthy committee, and not till then, struck the idea that it would be well to find a stone with which to build. So they went on an excursion with their architect, and having found a stone to their satisfaction, asked for tenders on it. Was there ever anything more bungling, unbusinesslike, and altogether disgraceful? Now comes the final touch — the agreement between the architect and the council, although half the work of the office was already completed, — and it is this: The architect to receive as commission 4 *per cent* on the outlay up to $40,000, and 3 *per cent* for the rest, which at least will be $200,000. *And the architect accepts this.* Such a proceeding on the architect's part needs no comment from me, the matter is so often before us in professional journals, and has so often been criticized in these pages that the opinion of competent judges is well known, and the general feeling also. But this is not the only matter to be commented on at the present moment in which this corporation are so honorably distinguishing themselves. Toronto is a youthful city and is buying its experience, but at a rather unusually high price. Citizens have recently had sprung upon them the astounding fact that the Queen's Park and approaching avenues (the only park in the city) leased by the University of Toronto to the corporation, had been seized by the University for noncompliance of the corporation with certain conditions of the lease as regards fencing and such things. The council wakes up to find the lease hopelessly cancelled. Of course the corporation cat is alone to blame, but it does not lessen the disaster. A compromise is now being attempted. The University offer to lease it again at something like $25,000, or about half its value to them, but a fearful addition to the sum previously paid.

But let us turn to something more pleasant than the sickening dealings of corporations. Minerva has found a more welcome reception in Toronto than elsewhere in Canada. Her devotees are alive to her charms, and do their utmost to advance her rightful claims, and it is to be hoped that they will succeed. Two temples to her honor are contemplated, a conservatory of music and an art gallery. The Art Association are holding an art fair among sixteenth century-booths and embattled walls very neatly and prettily got up. The collection of pictures is good, and may be taken as typical of Canadian art: a feature of the fair is the costuming and fancy dresses; among these is a gorgeous group of sixteen female gypsies in brilliant gala attire. Unhappily the expenses have been so great that it is feared the surplus will be small.

The long winters, when, until recently, no building at all was done, make the "building season" a busy one, and because the summer is short the workmen do their worst, and are always striking. If it is the bricklayers one season it is the carpenters next. And it is the carpenters' turn this year. Wages are very high, 33 cents an hour for bricklayers and masons, the carpenters getting only 25 cents and wanting 27 cents, with one hour a day less. The miserable system of paying good and indifferent men the same wage cannot be too strongly condemned, and yet that is what this proposed carpenters' strike amounts to. In Montreal the men do not strike so much, but then they do not work so much; the building season is even shorter there than in Toronto. A great building, or series of buildings, is soon to be begun in Montreal, namely, the general hospital for all denominations, for which two wealthy citizens each gave $500,000. Mr. Saxon Snell, of London, has been out about it, but there is still a disagreement about the site owing to the propinquity of a reservoir to the site chosen by the donors.

Both cities are well supplied with building materials, stone of good quality and color being obtained at short distances from either city.

The "mountain" limestone at Montreal is very hard, but does not weather well, and is of a coarse grain, but there are excellent stones of any size to be obtained from quarries a few miles out. Toronto has its Credit Valley stones, red and white sandstone, very hard, but a great deal is imported from the States, and stone is to be shipped from Europe and put into our markets at the price of local stone (according to the agents.) Stone is used far more in Montreal than in Toronto, and that gives Montreal a more substantial appearance.

It is greatly to be regretted that architects do not associate more than they do in Canada. In Montreal the jealousy between them is extreme, but in Toronto attempts have been made to draw them together, but although more warmly appreciated than in Montreal, none have proved successful. There is no such thing as a system of instruction for pupils. A boy comes into an office and expects a salary and pays no premium. He is taught enough to make him of use, and off he goes to some one who will pay him a dollar a week more than he is being paid. There is a want of a proper class of pupils, a bad look-out for the art in another generation, except that perhaps owing to the large number of *architects* and "architects" *so-called*, already practising in both cities it would be as well if the ranks were thinned out a little before there is any addition to their numbers.

EXHIBITION OF AMERICAN PAINTINGS AT THE ART INSTITUTE. — THE PRIZES. — POSSIBILITIES ATTENDING AN EXHIBITION OF ARCHITECTURAL DRAWINGS.

THE important art event of the past month has been the opening of the first annual exhibition of American pictures at the Institute. This is intended to be henceforth the great feature of the year, and is expected to be especially a stimulus to American artists, whose pictures are the only ones entitled to compete for the prizes. Artists have responded *en masse* to the invitation, and the committee has had no lack of material to select from. The catalogue shows three hundred numbers, while the rejected efforts were said to make an even longer list. Pictures were sent from all parts of the country, several coming from the Pacific slope, and one or two from the South, but by far the greatest number are from New York. Boston and Philadelphia have responded in a much less degree than would have been expected from their supposed artistic population.

The prizes are two (though it is hoped to eventually increase this number): the first known as the Ellsworth Prize, and established by Mr. J. W. Ellsworth, consists of three hundred dollars for the best oil painting by any living American citizen; the picture to have been painted in the United States, and not previously exhibited in Chicago or vicinity. No competitor can take this prize a second time. The other recompense is the Art Institute Prize of two hundred and fifty dollars for the next-best oil painting by any living American citizen; the picture not to have been previously exhibited in Chicago or vicinity.

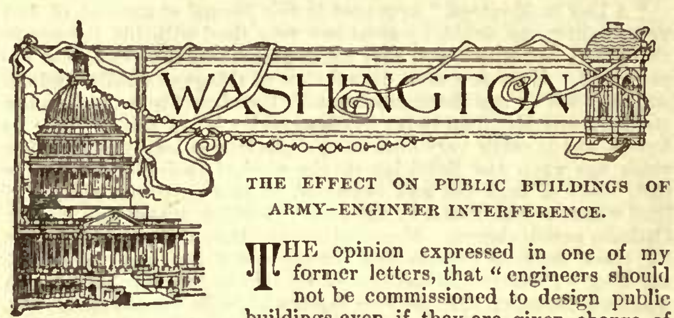
A view of the pictures at once shows that this exhibition, like all other purely American displays, is, as a whole, not strong in pictures of the human figure, but in landscape work there is an extremely high standard. By reason of the low general average of figure paintings, those, however, who are skilful shine with greater brilliancy by comparison. As usual the odd, bizarre and pre-Raphaelite have a strong representation, and to do the "proper thing" one should go into raving ecstacies over at least one of these. Undoubtedly the women in these pictures are homely and scrawny, and the angels' wings look so thin and bedraggled as to have suggested to one critic the absolute necessity of the immediate use of tar soap; but still the effect is striking, and the fervor is correspondingly great. There are landscapes taken at all hours of the day and night, and at all seasons of the year; views of the ocean, views of meadows and views of mountains abound, and very many of them are such charming bits that one longs to be the fortunate possessor of one of them.

One objectionable feature of the exhibit is the large number of pictures under glass, so that the light is reflected in a disagreeable manner. As a matter of fact the great majority of these pictures that are thus announcing to every one how very choice they are, are not the canvasses that are attracting the most attention. The prizes will be awarded about the time this letter goes to press by a committee composed of Mr. Thomas B. Clarke, of New York, Prof. Halsey C. Ives, of St. Louis, and Mr. Chas. L. Hutchinson, president of the Chicago Art Institute.

Notwithstanding the catalogue title, which calls this an exhibition of American *pictures*, one notes with satisfaction that there are several works from the sculptors' hands, and nearly all of them are well worthy of more than a casual glance. But one looks in vain for anything from the hands of the architects. Probably their exhibit would fall more strictly within the lines of a water-color or a black-and-white exhibition. However this may be, assuredly at some time during the year the authorities of the Art Institute should make an earnest endeavor to have an exhibition of this class of work. The architects of Chicago, with the assistance of the Architectural Sketch-Club, could alone certainly every year fill one wall with creditable productions. Judging from the reports of the New York exhibition, when the architects took part, not only the profession enjoyed and profited by the display, but the general public (who assuredly with us in the West need art education in architecture now more than in any other branch) took a much keener interest than was anticipated. Without question, to get such a display together would, the first time, require much labor on the part of some one. Many of the finest pieces of work executed by an architect are done after drawings made in pencil on brown paper, and not more than half finished up.

Naturally architects feel some diffidence in displaying in such a public manner drawings of this character, yet they often show the real spirit of a designer's work, and are infinitely more enjoyable and instructive than more carefully finished drawings and photographs; but as for photographs, they should have no place in such an exhibition.

Just now that the Art Institute is receiving somewhat of an impetus on account of this exhibition, an effort is being made to pay off the debt which was incurred for the new building. Several public-spirited gentlemen are said to have offered to subscribe one thousand dollars each towards it. Should this worthy object be accomplished the Institute will at once find itself in a condition to carry on the collection of fine works of art of all kinds on a much larger scale than has hitherto been possible.



THE EFFECT ON PUBLIC BUILDINGS OF ARMY-ENGINEER INTERFERENCE.

THE opinion expressed in one of my former letters, that "engineers should not be commissioned to design public buildings even if they are given charge of the construction thereof," has given me food for consideration, and I conclude that they should neither design nor have charge as superintendents, except as subordinate to the architect. The profession as well as the public should lay to the account of engineer [army engineer] interference much of the lack of artistic feeling shown in some of our late public buildings. As such interference cannot be too much deprecated, I have taken pains to look the matter up. One evil is that the engineer frequently gets the credit of the design and construction, and the architect fails to get his due amount of honor; another is inartistic work. It only needs a few illustrations to show its bad effects.

In some newspaper clippings which have come under my notice, the wings and dome of the Capitol — for which our lamented Ex-President A. I. A., T. U. Walter deserves the whole credit — are enumerated, among other things, as the work of Gen. Meigs. Such a claim is made at least by implication in a pamphlet which is quoted below. The only foundation as far as I can find out is that the General had at the time a general supervisory charge, particularly financial, and nothing more to do with design or construction than the Secretary of the Treasury has to do with the Supervising Architect of the Treasury Department in his designs for the post-offices and court-houses.

The same engineer was called in as consulting engineer by the committee who had charge of the erection of the National Museum, but the claim that he was the architect was so persistently circulated that it was difficult to find out who deserved the title, the claim being made with Meigs's authority in the pamphlet quoted below, the commission Sherman, Parker, and Baird apparently finding it necessary to insert in their report that they "selected Messrs. Cluss & Shultze, whose plans for the new building were those approved by the Congress, as the superintending architect." This settled the question. Some of the advice given by the consulting engineer is curious, showing the complications likely to arise, and the architects found themselves much hampered in consequence.

They made sketch plans and put the cost at about $250,000, a very small amount for such a large building. The engineer informed the committee in writing, and the letter is extant, that such a building could be erected for $100,000 in a plain manner and $112,000 in an ornate manner. The sequel demonstrated the error. The building cost about $250,000 without heating, and even this limited cost precluded the use of stonework and carving which would have added materially to the effect.

The Pension Office is really the product of the same engineer. In a brief for claimant M. C. Meigs *vs.* the United States, published in pamphlet form and possibly written by himself, as no counsel's name appears, reasons are given why he should be paid for the Pension Building in addition to his pay as a retired army officer. I take

several extracts: "The fact that he enjoyed a pension he recognized, and he proposed as being therefore able to work for a less professional remuneration than an architect who depended entirely upon his professional earnings, *viz.*, $10 per diem, instead of the usual 5 per cent, on cost." . . . "In constructing the wings and legislative halls of the Capitol, the dome of the Capitol, the General Post-office building, he never charged or received a dollar of compensation beyond his pay and allowance as a Captain of Engineers. Nor has he received any compensation for the projects and designs which he supplied while Quartermaster-General which lead to the construction by Congress of the National Museum."

The design of the Pension Building is a slavish copy of the Farnese Palace with just enough variation in proportion and detail to destroy its beauty. I have before me lithograph plates "Parties Principales de l'Elevation du Palais Farnese," and lithographic sheets from the Pension Building, and a comparison sheet for sheet shows the evident copy. The one for the first, second, third story windows and main cornices being so nearly identical with the other that it could only have been copied. In general proportions the building is flattened and lengthened. The ornaments on the frieze are original; they consist of a bursting bomb and a cannon "standant," alternating, instead of the beautiful Greek acanthus and fleur-de-lis which alternate on the original.

All acknowledge the unfortunate character of the design, but some of the most glaring faults are in its plan and structural features where an engineer is supposed to be strong. The enormous interior court 116 by 316 feet is good for one thing, an Inauguration ball. The rooms are deep, so deep that the back portions of them are practically useless for want of light, being 36 to 38 feet from the windows. The openings on the court being screened by the balconies are only of small use. This large central hall was intended to be as warm as the rest of the building and the rooms were to have no doors. As soon as it was occupied this was found impracticable, as the draughts were unbearable to the officials and the doors were put in as an extra. But as the only communication between these rooms is by a passage-way through this interior court, it must be heated at all times as nearly to the temperature of the rooms as possible. In other words the Government must pay for heating this court at the cost of about seven tons of coal a day, I understand, so that the politicians may have an inaugural ball-room one night in four years, to which the usual admission fee is five dollars.

The architect's fee would be a small item when this heating expense is taken into consideration. Other large buildings approximating this in size, if the central court is left out, take one ton or less per diem.

The walls run down deep enough to allow for cellar room beneath the whole building. The only additional cost would have been in excavating. No such cellar was provided for originally, but on the south where the walls went down some sixteen feet below the surface a cellar was put in.

The third-story rooms had a ceiling of 28 feet high, required, Gen. Meigs claimed, for the exterior architectural effect. As there were 12 feet to 13 feet from the windows to the ceiling, an extra appropriation was asked to put a fourth floor in, which the report says will give thirty-six large rooms well lighted and ventilated. This upper tier of rooms had no exterior light. Recently they have been lighted by small hipped skylights, one to each room, placed in the roof — and a row of small skylights does not materially add to the exterior beauty of the building.

The appropriation to complete the building was $250,000 first, then $190,000 to complete, then to finally complete $266,559.62, then in the last report before me $41,000. This does not include tiling main hall, plastering and decorating main hall, elevators, etc., which have been paid for since the last report I have in hand or are yet to be paid. I understand that the actual cost when completed will be close to a $1,000,000.

This spring a commission consisting of J. C. Black, N. H. R. Dawson, C. D. Wright, J. E. Johnson and others were appointed to examine the Pension Building in reference to moving in additional bureaus. Their report among other things says that: "the upper new floor is not adapted to and cannot safely be used by clerks of the Government on account of the great heat and lack of ventilation. The basement and court floors are not fit nor safe for the use of such clerks. The clerks might almost as well be placed in an open street as far as health is concerned as in this court."

This is enough to show the remarkable inconsistency of Congressional effort to save a part of the legitimate fees of a well qualified architect.

The steps of the large stairway are of brick laid in cement. They are already wearing appreciably, and the entrance consists of four doorways about five feet wide, truly insignificant for such a building and almost destroying the utility of the interior court for its quadrennial use as the inaugural ball-room.

The drawings of one section of the War, State and Navy Department were made in the Supervising Architect's office under A. B. Mullett, the other sections are practically duplicates, but the work for years has been entirely in charge of Col. Casey an Army Engineer. The Monument and the Army Medical Museum [the plans being made by Messrs. Cluss & Shultze,] were put under the same engineer. The public, I think, invariably attributes the design as well as the construction of the War, Navy and State Department to Col. Casey.

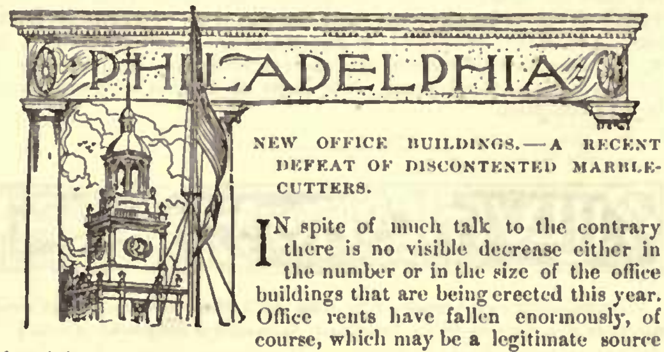
The remodelling of the Soldiers' Home for which Poindexter & Co. made the plans has also been put in the hands of an engineer, as far as supervising construction is concerned.

A Mr. Greene, assistant to Col. Casey on the War, Navy and State Department, has been put in charge of the construction of the Congressional Library building. Mr. Smithmeyer furnishes the plans and drawings.

The reason for this business usually seems to be a niggardly effort of Congress to save the fees of an architect at the expense of artistic and effective work. If such superintendents were put in charge under the supervision of the architect possibly no objection could be raised, but this is not the case. The engineers have entire charge of construction, they can change methods of construction and design for that matter, and even worse for the credit of the architect, they can put their own interpretations on the architect's designs and details.

It is well understood that the man that makes the design should have entire charge of the execution thereof, or much of his work will be put up contrary to his expectation and usually to the detriment of good architecture.

In this connection it would be well to add that the selection of designs for all public buildings should undoubtedly be given to a committee of non-competing experts, as the average Congressional committee-man knows little, I might say nothing, about such things.



NEW OFFICE BUILDINGS. — A RECENT DEFEAT OF DISCONTENTED MARBLE-CUTTERS.

IN spite of much talk to the contrary there is no visible decrease either in the number or in the size of the office buildings that are being erected this year. Office rents have fallen enormously, of course, which may be a legitimate source of satisfaction to many people, but unfortunately there is very little cause for congratulation from the point of view of architecture, for with two or three notable exceptions the designs of the new buildings are either entirely commonplace or obtrusively vulgar. A building that stands forth in the most delightful contrast to these contemptible designs is for the City Trust Safe-Deposit and Surety Company. The site has no particular advantages, the front is indeed very narrow and the treatment of it in no known style except that it vaguely suggests Gothic, yet its simple limestone face pierced with handsome windows and broken only by a three-story oriel growing naturally out of the wall and by a very small copper one in the gable makes as satisfactory a front (if we except a few reproductions of Classic temples) as may be seen from one end of Chestnut Street to the other. Next to the soaring gable bounded by curved lines that spring without abruptness from the party-walls, the most charming detail about it is the border of carving exquisitely designed and sympathetically executed that follows down each side and makes a frame, as it were, to the front. Followers of Mr. Ruskin object to the delicacy and elaboration of the carving, any ornament that is not of the simplest character being in their opinion eminently out of place on a business building. A just criticism is made by some people who maintain that the lower story of blue-veined marble columns (in color very like what the columns of the Ducal Palace must have been before time had stained and polished them) is of a weaker looking material than the white wall above it. Yet we can but congratulate ourselves when we think how much weaker looking the lower story might have been and how fortunate it was that the owners did not stipulate that the building should have the air of standing on a sheet of plate-glass. By far the most important building now nearing completion is the Drexel Building. Its design is calm and dignified and the simplicity with which the huge mass is treated gives it much impressiveness. The construction is one that is not very usual here, the weight of the floors and roof being entirely received by an iron frame-work while the white marble walls support nothing but their own weight. It was during the erection of these walls, by the way, that a characteristic strike occurred which helped considerably toward the breaking up of the Society of the Knights of Labor. The contracts for the marble-work amounted to about a million dollars and were divided between two well-known firms. The "Union" marble-cutters seized the opportunity to strike. There was no question of wages in the matter. The contractors were merely informed that if all non-Union men were not discharged everybody else would stop work. The "bosses" replied that they would not discharge men simply on the ground that they did not belong to the Union, and ordered all marble to be finished in Maryland and Vermont, at the quarries. A Union meeting was held and a delegation instructed to visit the quarries and compel the marble-cutters to stop work. When this committee arrived at the Vermont quarries and ordered every man to throw down his tools it was informed that the Vermonters cared nothing whatever for the Philadelphia Labor Union and would give its delegation four hours to leave the place. The walls of the Drexel Building have been excellently

built without help from the dictatorial Union many of whose members have unfortunately lost about a year's wages by their ill-advised action.

In speaking of the well-designed fronts of some of the buildings now in course of erection it would seem unjust not to mention one that has just been finished, the Insurance Company of Pennsylvania's on Fourth Street. The cornice and gable are undoubtedly heavy, some details of the ornament are larger than necessary and much of the carving is very bad, but taking the front all in all there is a purpose about the design of it and a beauty that makes men who take an interest in such things stop in the street and look twice at it. And now at the risk of dipping into the interminable list of buildings that have been finished for a year or more I must mention the delightful change that the new office building for Brown Brothers & Co., has made in the appearance of the busy corner of Fourth and Walnut Streets. The graceful structure with its steep roof, its tall bays and its delicate detail looks a perfect combination of strength and lightness and its pleasant buff tone contrasts charmingly with the Wood Building opposite, that pioneer among the successful office-buildings of Philadelphia.

If so very few of the newest office buildings here are up to the standard of excellence that one finds in New York and Chicago, the latest buildings for the use of large wholesale firms are even less worthy of notice. With scarcely any exception, these are little better than the aimless façades of thirty years ago. They are more varied and more startling but (with the exception of a growing tendency to show that ironwork is ironwork and not to try to disguise it as stone) show no improvement over the execrable cast-iron productions that have for so many years made parts of Market Street hideous beyond compare.

THE ILLUSTRATIONS

[*Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.*]

DOORWAY OF HOUSE OF NATHANIEL THAYER, ESQ., BOSTON, MASS. MESSRS. STURGIS & BRIGHAM, ARCHITECTS, BOSTON, MASS.

[Helio-chrome, issued only with the Imperial Edition.]

OLD STONE PORTALS, STOCKHOLM, SWEDEN. SKETCHED BY MR. M. BORGSTEDT.

THE city of Stockholm, Sweden, which after the lately prevailing building-boom will show the stranger a good many buildings of modern architecture of great merit, has yet some very old examples of architecture left which are worth attention. They consist principally of high-pitched gables and portals, in style showing the influence of old German barock and are applied to fronts perfectly plain for the rest, an arrangement which makes a good effect by the contrast. The portals, of which sketches are here shown, are about 250 years old, but yet are among the best preserved. They were erected at a time, when Sweden was involved in war in Germany. The long-continued war made its impression on everything and even on these portals, as shown by the emblems, put on here and there. On the larger sketch we see at the top two harnesses with helmets and lances and on one of the smaller ones guns, put upright against the side-pilasters. The other one shows two warriors, placed on top of cornice, and below the same two angels, as symbols of peace, holding wreaths of laurels in their hands in order to crown the victorious warrior. The fruits and the bags, on top of the heads are reminders of the riches, acquired by the war.

HOUSE FOR T. C. LEAKE, ESQ., RICHMOND, VA. MR. M. J. DIMMOCK, ARCHITECT, RICHMOND, VA.

THE materials used are sand stock brick with brownstone in the rough and portions to be dressed, terra-cotta panels, etc., and the roof ornaments and gutters of copper, slate roof. The interior of principal rooms to be in hard woods polished; dining-room and hall, quartered oak; parlor and library, mahogany, and chambers in cherry, white walnut and yellow pine. Lot 90′ wide, 150′ deep.

HOUSE AT CARPENTER STATION, P. R. R. MESSRS. COPE & STEWARDSON, ARCHITECTS, PHILADELPHIA, PA.

HOUSE OF JAMES HACKETT, ESQ., CARPENTER STATION, P. R. R. MESSRS. COPE & STEWARDSON, ARCHITECTS, PHILADELPHIA, PA.

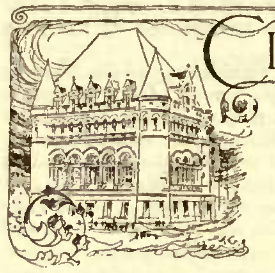
ACCEPTED DESIGN FOR THE REVIEW CLUB, CHELSEA, MASS. MR. W. A. NORRIS, ARCHITECT, BOSTON, MASS.

TOMB OF CARDINAL RICHELIEU IN THE SORBONNE, PARIS. GIRARDIN, SCULPTOR.

TOMB OF LEONARDO BRUNI IN THE CHURCH OF SANTA CROCE, FLORENCE. BERNARDO ROSSELLINO, SCULPTOR.

COMPETITIVE DESIGN FOR THE MASONIC HALL, PITTSBURGH, PA. MESSRS. BICKEL & BRENNAN, ARCHITECTS, PITTSBURGH, PA.

CINCINNATI.



A BOYCOTTED BUILDER OBTAINS RELIEF AND IS LIKELY TO OBTAIN REDRESS.

THE matter of "boycotting" in this locality had grown, up to very lately, to be almost a curse, its practices had grown so that a man really did not own the business he was endeavoring to carry on: a man would take large contracts, make all necessary and proper arrangements for carrying the same to a successful issue, would be largely responsible for debts incurred on account of these contracts, and then, without warning, as a thief in the night, this boycott would steal in, and utterly destroy the carefully arranged plans which took so much time and trouble to prepare.

The time has about come, however, when it will be lawful and proper and right for a man to pursue his business methods without let or hinderance, at least from outside parties, without having outsiders say how the business shall be carried, who shall be employed and where he shall get the material with which to carry out his contract. Both the Common Pleas and Superior Courts of this city have recently held that "boycotting" must stop. The case was substantially as follows: In January, 1887, the Journeymen Bricklayers' Union and the "bosses" (so-called) had their usual agreement as to the wages to be paid and the number of hours to the day; this agreement was to stand for a year and there was to be no strike. Along in the early spring of the year, it appears that the hod-carriers had a grievance against the bosses, inasmuch as they were employing what the hod-carriers were pleased to call "scab-labor," *i. e.*, men who did not belong to the Hod-Carriers' Union, but who, nevertheless, could carry the hod and "more mort" with as much grace and ease as could the oldest member of the Union. Because the bosses would not agree to discharge this alleged scab-labor the Union hod-carriers all went out on a strike; and then the members of the Bricklayers' Union, who had no cause of action against the bosses whatever, took up the cause of the hod-carriers and went out on a strike that lasted perhaps six weeks.

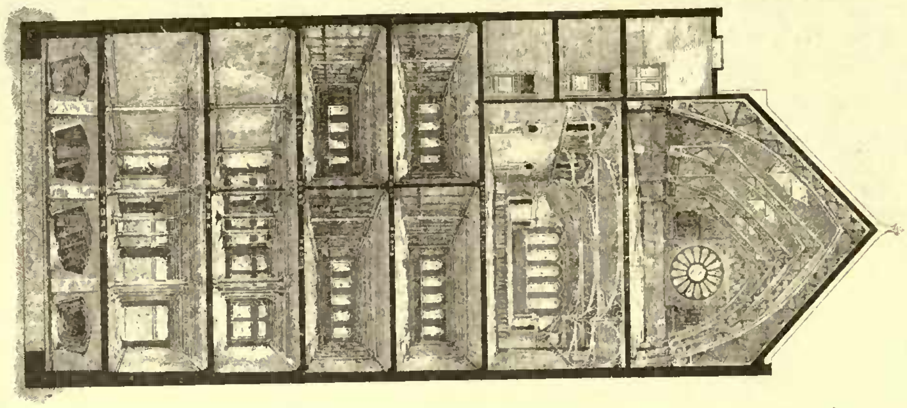
The bosses could, no doubt, have come off victorious in the fight had not one of their number backed down and discharged all non-Union men, and promised to never more employ any but Union men. As this "boss" was one of the largest contracting bricklayers in the city, his action caused a termination of the strike, except in the case of Messrs. N. & C. Parker, who held that the bricklayers were wrong in going on a strike when they had agreed not to do so, and now comes the case in hand.

Messrs. Parker were left to fight the battle alone. The Bricklayers' Union instituted a complete and systematic boycott; they issued a circular which was sent to owners of buildings where the firm had any contracts, and these owners were informed that the Messrs. Parker were not doing good work inasmuch as they were employing "scab-labor;" the circular was also sent to all materialmen informing them that their material would not be worked in any building whereon the said Parkers were doing the brickwork. At this point in the performance, Messrs. Parker, through their attorneys, Messrs. Bateman, Harper & Bailey, brought suit for libel, which was sustained by the court. Their second cause of action was for an injunction to restrain the Union from further interfering with their affairs, and to stop this boycott. Judge Kumler, of the Common Pleas, and Judge Taft, of the Superior Court, very plainly told the Union men that they must stop this boycott business. Notwithstanding the above injunction, some of the men persisted in their evil ways and were brought into court for contempt, but pleaded that they were not informed as to the injunction, and the court let them off with the admonition that a repetition would be dealt with very severely.

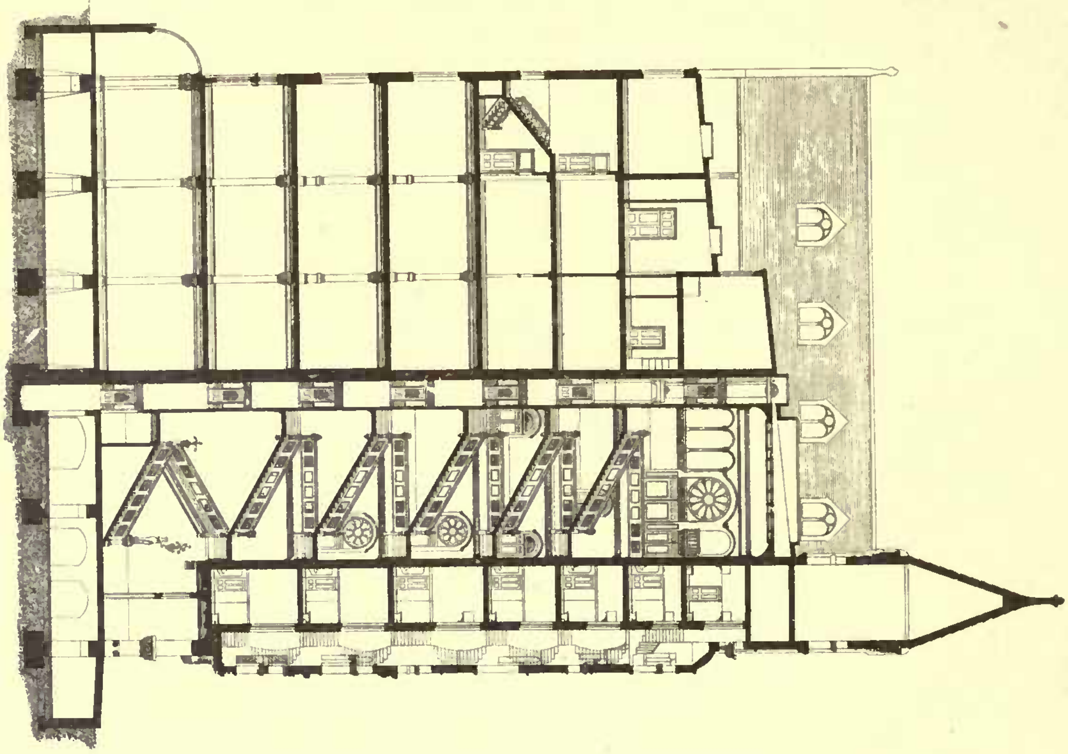
Another cause of action was for damages caused by this untoward interference by the Union with their (Parker Bros.) business; making it much harder for them to get labor or materials, and in several cases the owners of buildings becoming alarmed had to annul existing contracts; this cause of action has not been heard yet, but comes up soon. Taking the case altogether it is one wherein those who expend their time, brains and money have every reason for congratulation that they will be allowed to carry on their enterprises without such interferences as this case showed has heretofore existed.

THE HOTEL BRIGHTON FINALLY IN PLACE. — The Hotel Brighton, at Coney Island, was finally placed on its new foundations April 28th. The cost of the moving was over $30,000.

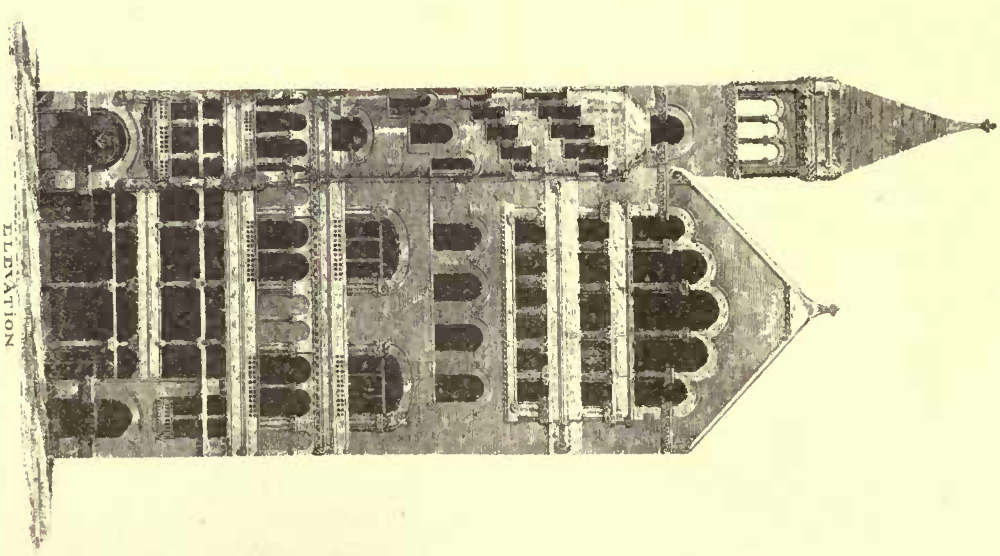
COPYRIGHT 1888 BY TICKNOR & Co



— View of Interior —



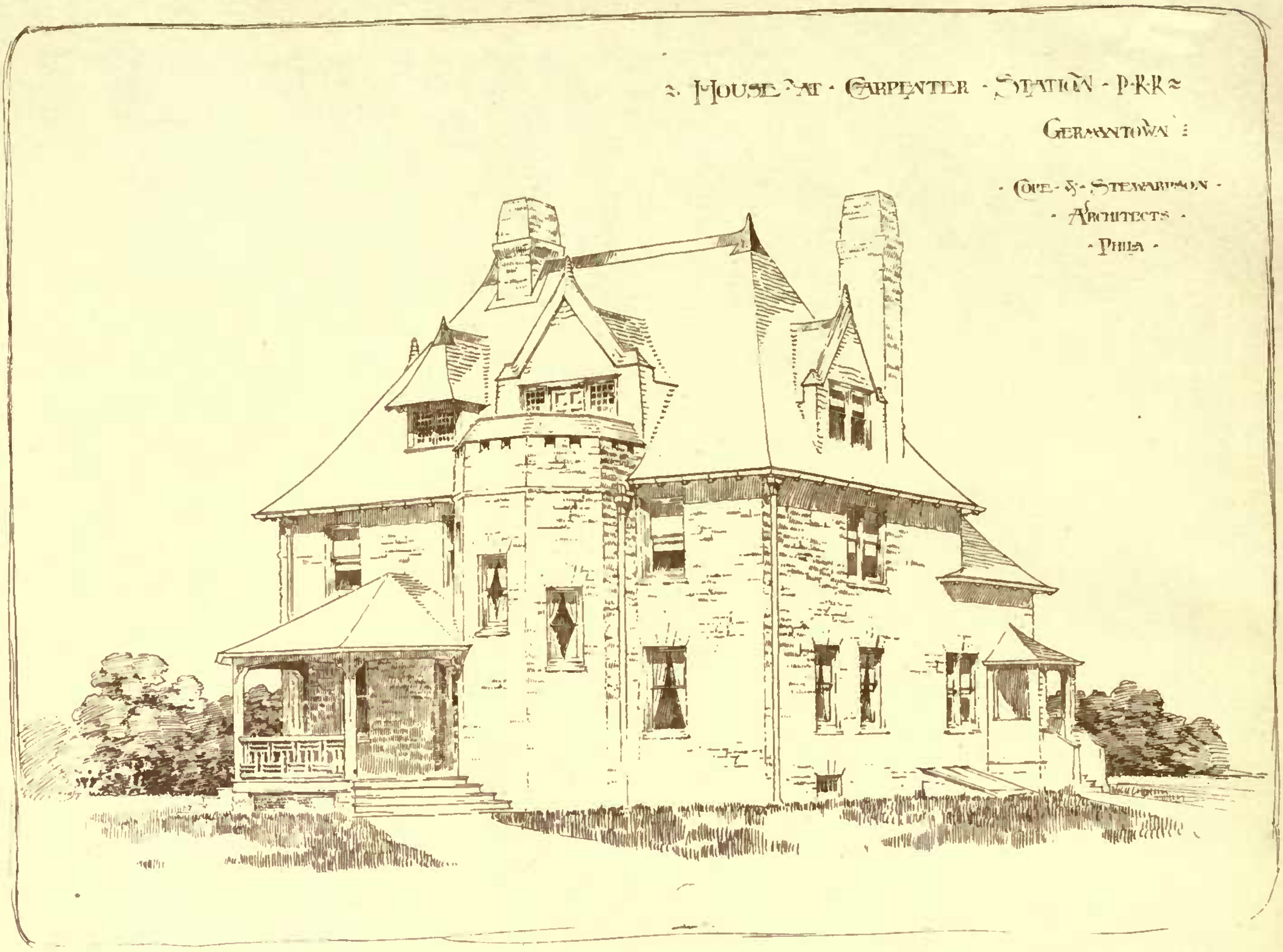
— Longitudinal Section Thro' Stair Hall —

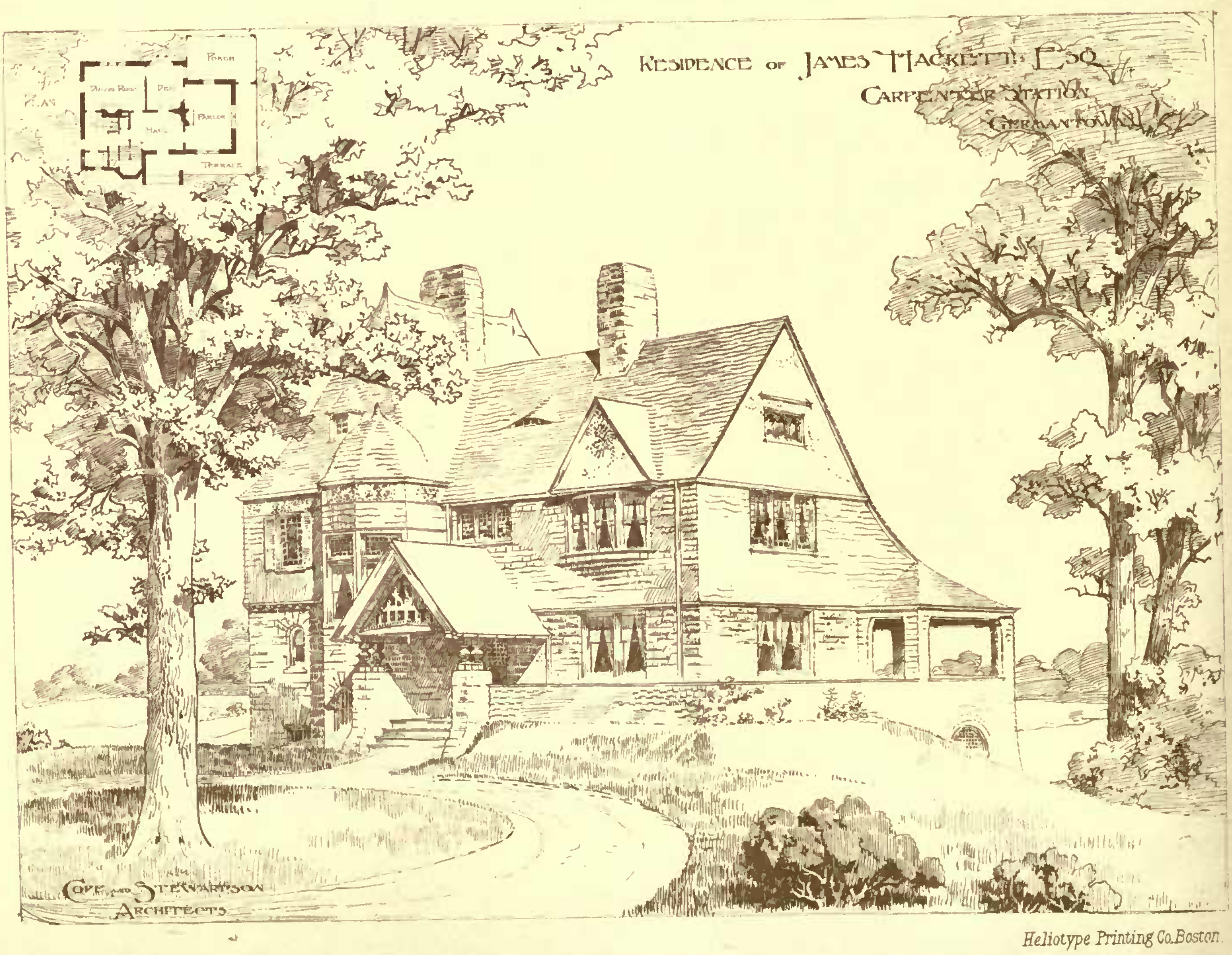


ELEVATION
Competitive Design for
MASONIC HALL

Heliotype Printing Co. Boston.

COPYRIGHT 1888 BY TICKNOR & Co

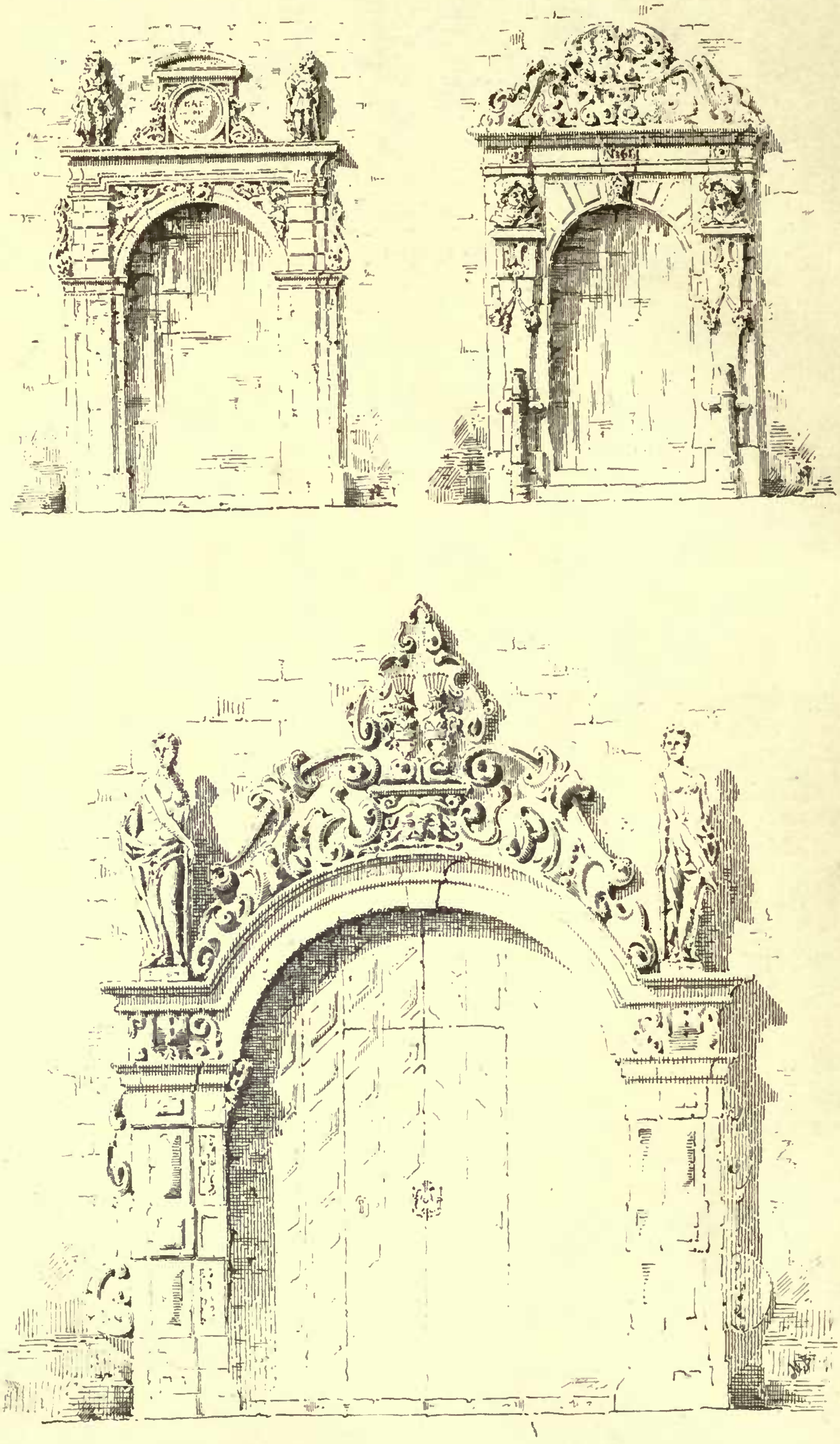




Heliotype Printing Co. Boston.

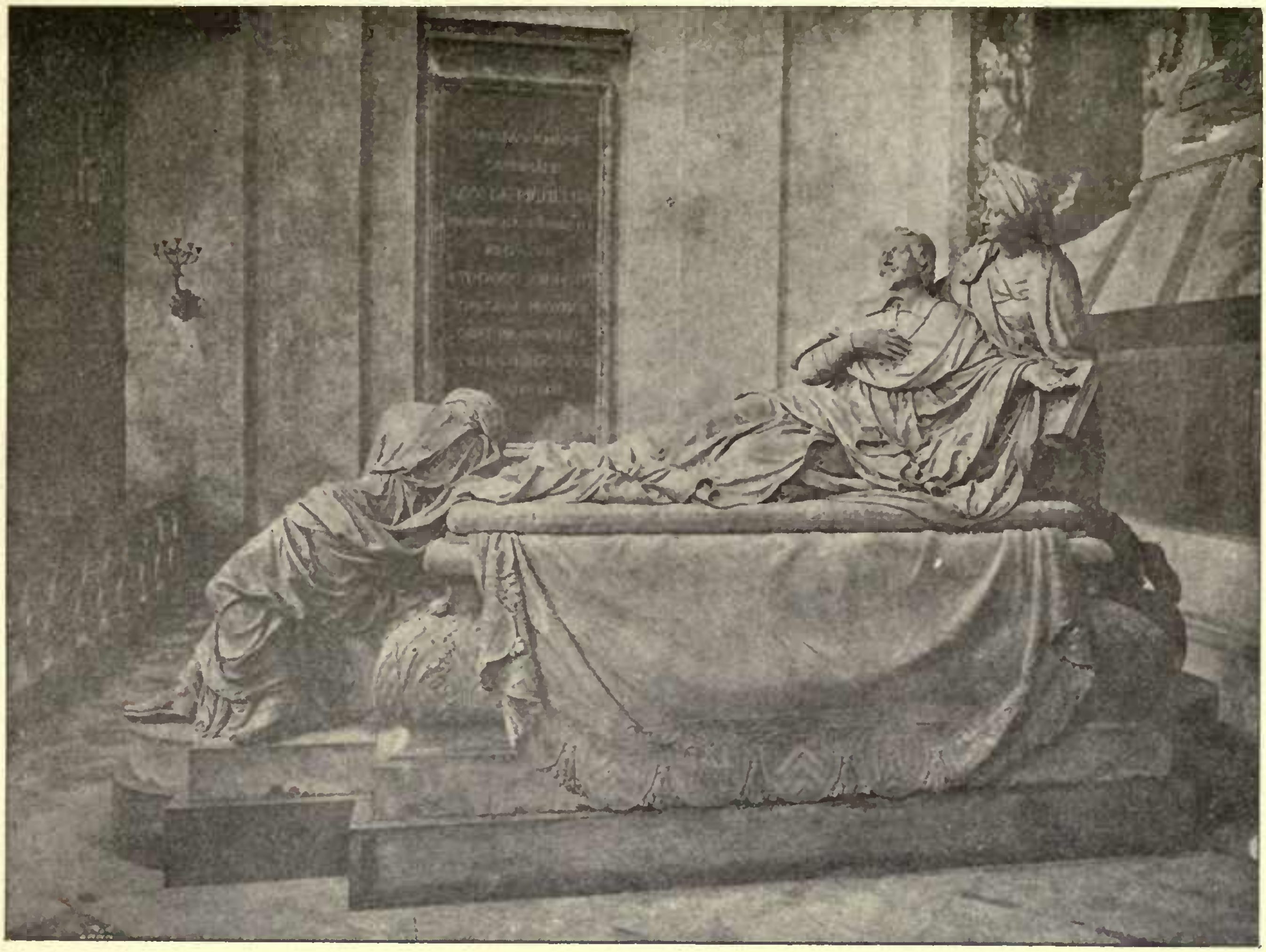
COPYRIGHT 1888 BY TICKNOR & Co.

Old Stone Portals from Stockholm, Sweden.

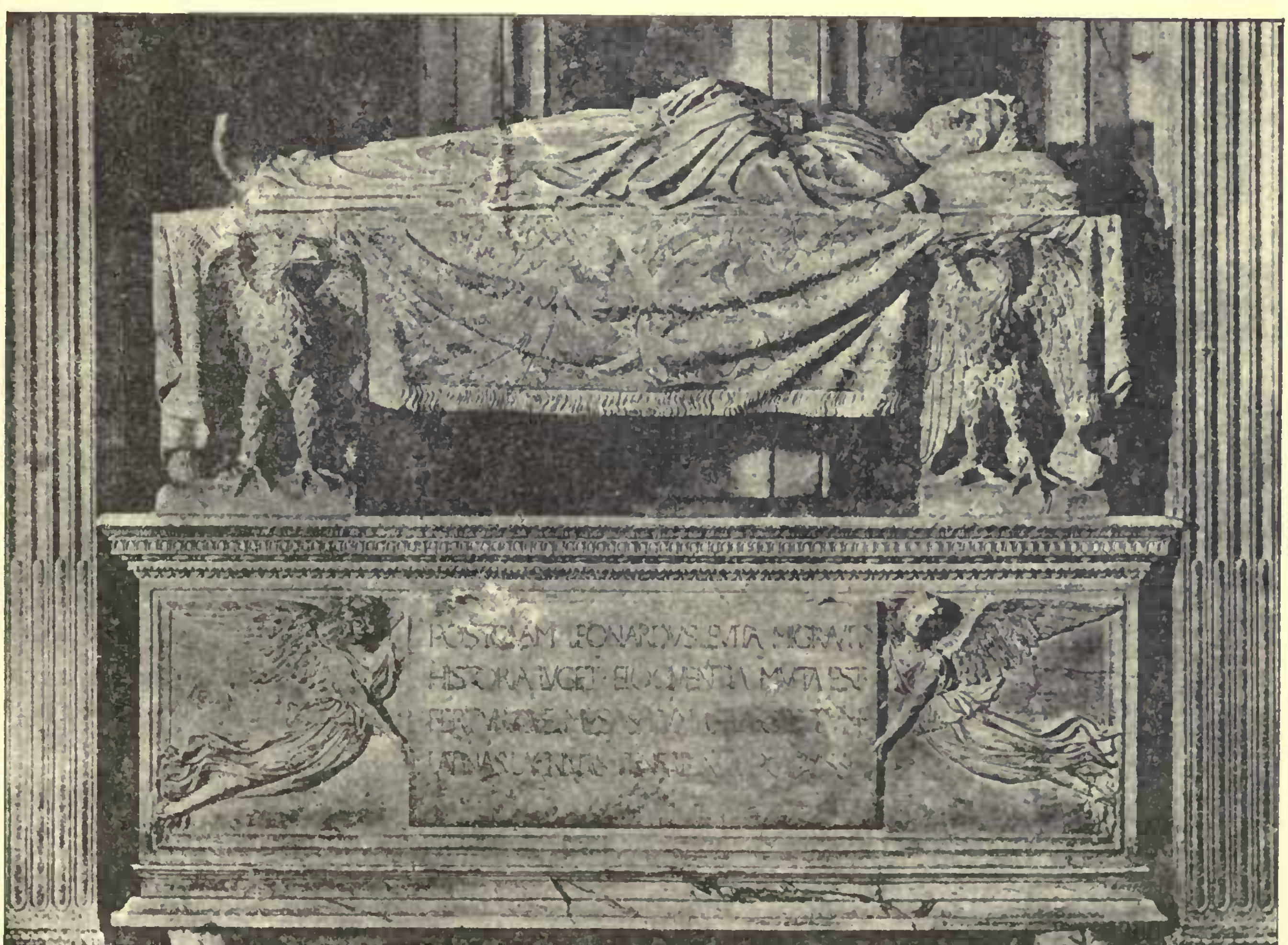


Heliotype Printing Co. Boston.

COPYRIGHT 1888 BY TICKNOR & Co



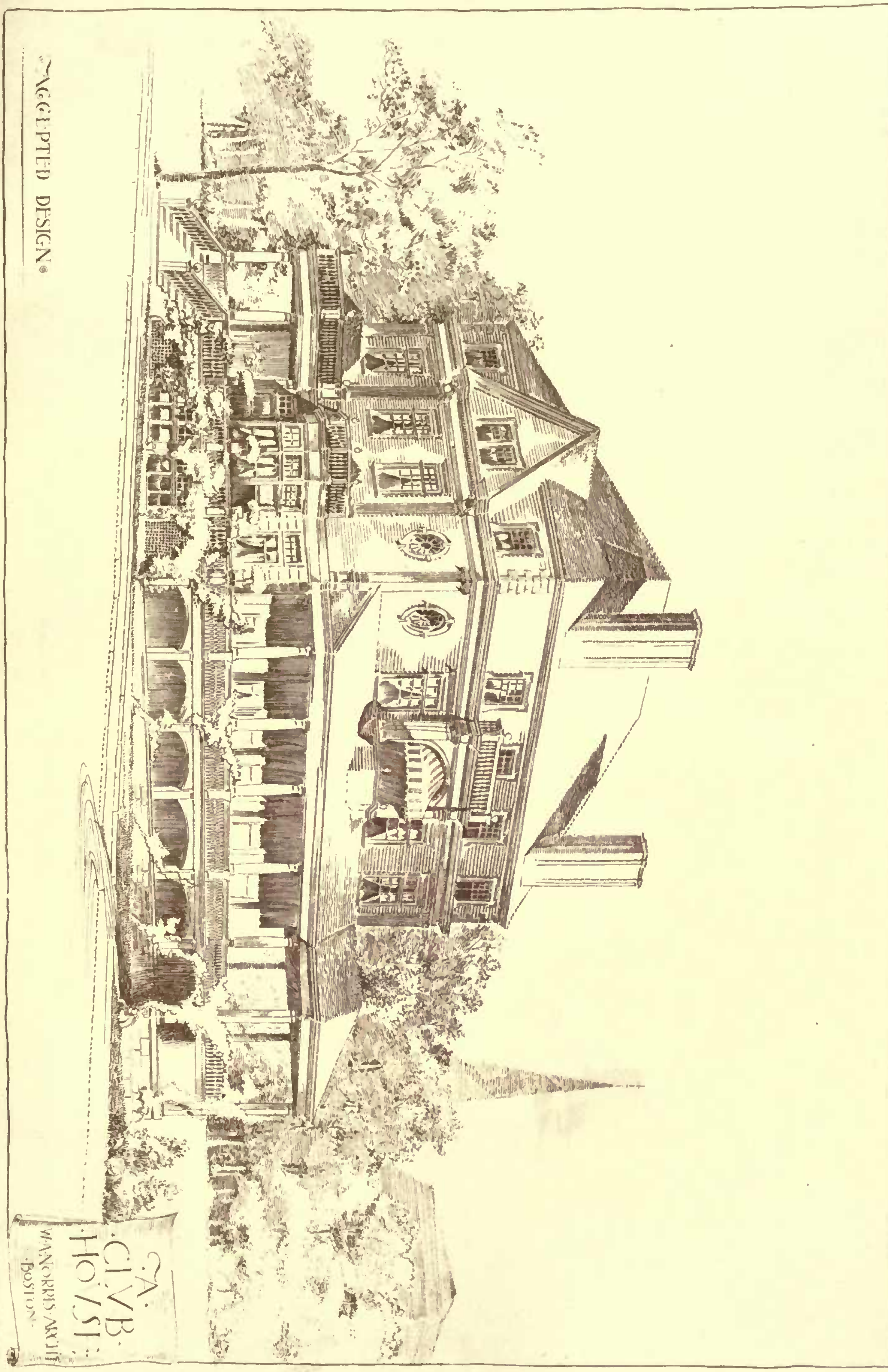
TOMB OF CARDINAL RICHELIEU IN THE SORBONNE, PARIS



Heliotype Printing Co. Boston

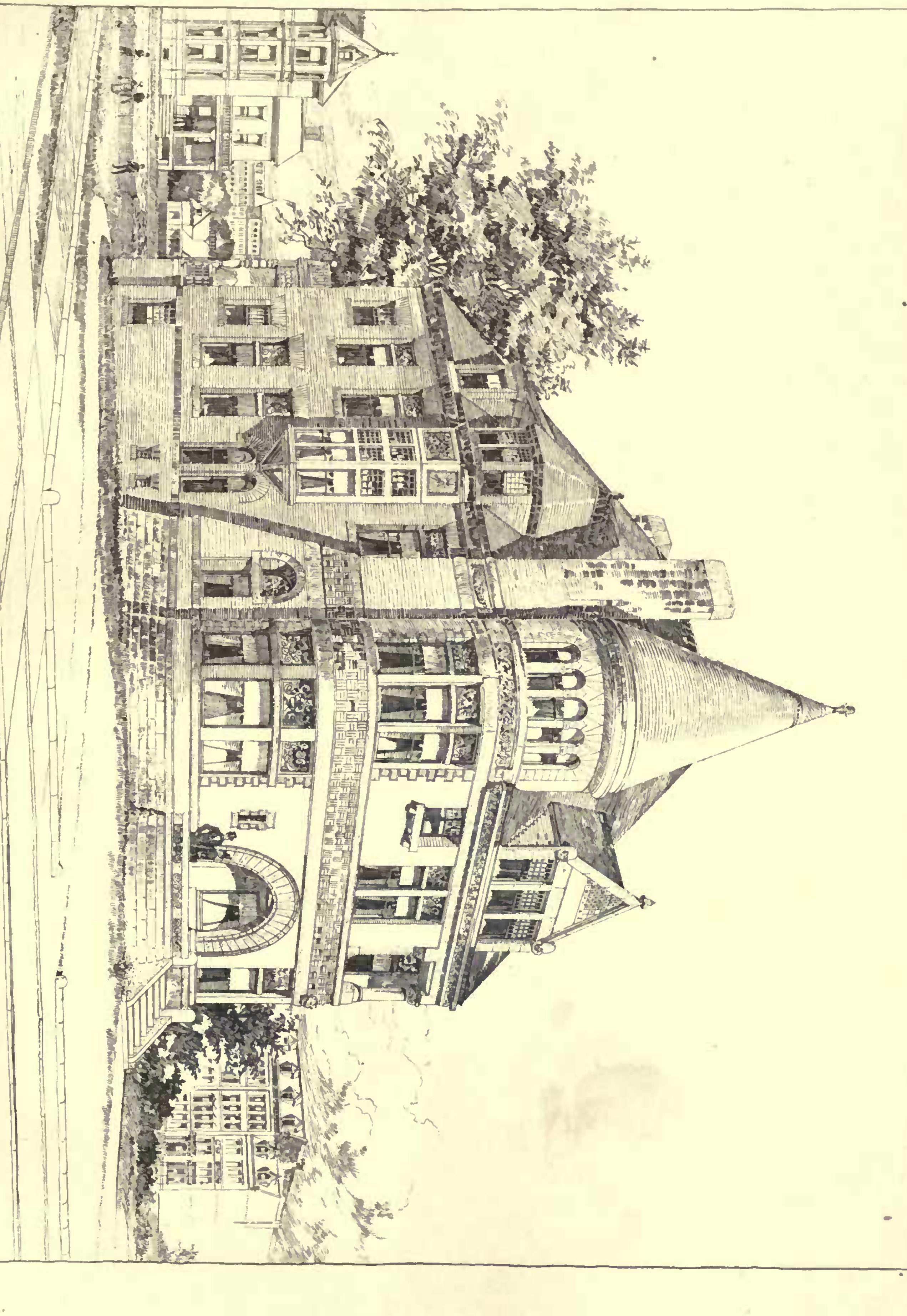
TOMB OF LEONARDO BRUNI IN THE CHURCH OF SANTA CROCE FLORENCE

COPYRIGHT 1888 BY TICKNOR & CO



Heliotype Printing Co. Boston.

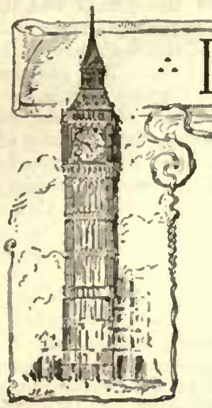
COPYRIGHT 1888 BY TICKNOR & Co.



RESIDENCE OF T. C. LEAKE ESQR RICHMOND VA

M. J. DIMMOCK ARCHITECT

Heliotype Printing Co. Boston.



LONDON

FATE OF THE ARCHITECTS' REGISTRATION BILL. — THE NEW PRESIDENTS OF THE INSTITUTE AND ASSOCIATION. — AFFILIATION OF PROVINCIAL WITH METROPOLITAN SOCIETIES. — GREEK OUTLINES. — THE HYDE PARK APARTMENT-HOUSE. — THE ADMIRALTY AND WAR OFFICE. — TEMPLE BAR. — THE LIVERPOOL CATHEDRAL. — THE EXHIBITIONS.

THE ignominous reception which the Architects' Registration Bill met with in the House of Commons on April 17, when it came up for discussion, has been a matter of no little surprise to everybody here. Considering that the knowledge of members of Parliament, unprofessional as they are, of this subject is necessarily crude and imperfect, yet we certainly expected the bill to make a better fight than it did. With the exception of a Parnellite, named Murphy, not a single member had a good word for it. Sir W. Foster, a prominent Gladstonian; Sir Lyon Playfair, whose opposition, seeing that he carried through a similar bill for the medical profession, was extremely significant; the Attorney-General and other well-known men all spoke against the bill, and Colonel Duncan, perceiving the inherent weakness of his position, like the good officer that he is, "retired for strategic purposes," or, in other words, withdrew his bill and did not even press for a division. So far as I can gather, the withdrawal of this ill-advised measure has been received with general satisfaction, but at the same time there exists, I believe, a widespread hope that some action in the direction of registration may be taken by the Royal Institute of British Architects as recognized head of the architectural profession in the British isles.

We have been busy at Conduit Street lately, electing new officers and putting our house in order generally for the conclusion of the session which is now, both at the Royal Institute of British Architects and at the Architectural Association, drawing near its close. The Institute has elected as its President Mr. Alfred Waterhouse, R. A., and the Association, Mr. Herbert D. Appleton. Mr. Waterhouse holds an exceptionally high position among English architects. The National History Museum, the City and Guilds of London Technical Institute, Owen's College, Manchester, the National Liberal Club and the well-known offices of the Prudential Assurance Company in Holborn, are all memorials of his genius, and bear the unmistakable stamp of his individuality. To Mr. Waterhouse is due, to a considerable extent, the great amount of interest which is now bestowed upon terra-cotta as a constructive material, and many other innovations in construction have also emanated from his office. Mr. Appleton is chiefly remarkable for the ceaseless energy and perseverance which he has unstintingly devoted to the Association, and which has certainly been one of the principal causes of the great progress that the Architectural Association has made during the past few years.

There has been a very good competition for the Architectural Association and Aldwinckle Travelling Studentships this year. The former has been gained by Mr. D. J. Blow for a very refined and painstaking set of drawings of a church near Canterbury. A very showy set of sketches, in a bold, flourishing style, was submitted by Mr. H. P. Burke Downing, and I also noticed some neat artistic drawings by Mr. Agutter. The Aldwinckle student is Mr. H. V. Lanchester, who achieved his success with some really excellent sketches in color of a late oak screen, etc.

Now that the registration bogey has disappeared — for a time, at least — there is a movement among the principal provincial associations in favor of affiliation with the central metropolitan societies. A new association has been formed at Halifax, Yorks, affiliated with the Architectural Association. I need hardly point out what an immensely powerful organization these affiliated societies, especially those devoted to education, will become if they all work together in one common spirit of unity, and we may be quite certain that one of the ultimate results of this union will be to fix a definite educational course for every architectural student to pass through, before he is eligible to enter his name for the examination in architecture.

The Association soirée took place shortly after Easter, and was eminently successful. The large hall in which it was held was crowded, and the audience, being largely composed of students, applauded the various topical references as only students can.

We have been reclining in a sort of classical atmosphere lately, so to speak. At the Institute the other night, Mr. F. C. Penrose, M. A., so well-known as the Director of the British School at Athens, gave us a very interesting account of "Some Recent Excavations at the Temple of Jupiter Olympius, at Athens." This school — to which you remember I told you that the Institute sent out a travelling student some short time ago — is now engaged upon further excavations which cannot but prove to be of great interest. At the Architectural Association Mr. Farrow analytically considered the contours of Greek mouldings, confining himself more particularly to the Doric capital. He demonstrated how the Greeks, commencing with the parabolic curve, gradually developed a more refined and graceful outline which he showed to be a sharp form of the hyperbolic curve in combination at either end with osculating circles, one example of which Mr. Farrow stated that he had ascertained to have a radius of not less than fifty-three feet. As, however, the mathematic properties of the conic sections were not investigated till after the construction of the Doric capital, one is forced to the opinion that the Greeks merely sketched in their curves, and did not set them out with the painfully mathematical accuracy that Mr. Farrow described. Mr. Statham took up the subject of cornices and string-courses, and gave us a very logical and interesting discourse upon this most important subject. The string-course, said Mr. Statham, entirely differs in principle from the cornice, and it is a grave grammatical error to make the one a simply subordinate form of the other. His lecture appears very fully in the *Builder.*

Some architects have recently designed a vast pile of residental flats to be erected overlooking Hyde Park, near Albert Gate. The height was stated to be somewhere about one hundred and eighty feet, and there has been a frantic public outcry, partly on the ground that the immense shadow which this building will throw on the Park will be intensely injurious to it. Questions have been asked in Parliament night after night, and one evening the First Commissioner of Works gravely announced that he had informed the architects that unless the building were reduced in height he would erect on the borders of the Park a wall to block out the light from their proposed buildings. Fancy a huge blank-wall nearly two hundred feet high. The matter has, however, been mutually settled by concessions by either side. While, however, the public is only too ready to strain at a gnat, it is prepared to digest the proverbial camel with the greatest readiness. The drawings of the proposed new Admiralty and War Offices have been published, and I really think that if England erects such edifices as her national buildings, she ought to be thoroughly and heartily ashamed of herself. Surely she ought to be quite satisfied with the National Gallery and the Royal Courts of Justice, without making herself a further laughing-stock to humanity by housing her chief Administrative Departments in the buildings whose designs have recently been published. Again, the priceless collection of national portraits, termed the "National Portrait Gallery," is still a homeless wanderer. When the fire took place at South Kensington, a momentary panic ensued, and the paintings were all carted down to a picture gallery at Bethnal-Green, in the East End. There they still remain, and there, to all appearances, they seem likely to stop until the crack of doom. We all so well know the way in which the beautiful Burlington colonnade was suffered to lie on the river bank at Battersea neglected and uncared-for, until it was quite ruined; therefore, we are mildly thankful that Old Temple Bar has passed into the hands of a private individual rather than it should remain under the tender mercies of public bodies. Like the woman before Solomon, we prefer to see our child given over to a stranger, rather than destroyed. England has been termed a nation of shopkeepers, but unless she shows a little more national spirit in these matters, she will earn for herself a greater reproach — a nation of barbarians.

In ecclesiastical matters, the reredos at St. Paul's is provoking some very bitter theological disputes, the Low Church party being very angry at what they are pleased to call "the Crucifix in our Metropolitan Cathedral." Of course, here, I have nothing to do with theological questions, and I really do not see that much fault can be found with the reredos *per se.* The apsidal wings strike me as a mistake. They are weak and meaningless, and the competition, so to speak, of the two apsidal curves of the reredos and of the church itself, is positively distressing, and still it is not much use criticising it, as it is never likely to be altered. Rather a joke occurred lately about the Liverpool Cathedral. You know, that some time ago, the Cathedral Committee advertised for designs, and eventually chose Mr. Emerson's. But they had put the cart before the horse, and when they came to look for the motive power, or, in other words, the necessary cash for building, it was not to be found. Well, one Saturday evening, all the papers came out with great flaring placards with "Munificent gift of a Cathedral for Liverpool," in large letters, and stated that Sir A. B. Walker had given a sum of £250,000 to Liverpool for its Cathedral, and "was awaiting with some impatience the completion of the plans" (as if, by the way, the plans for a cathedral could be "turned out" in a day). This formed a subject of warm congratulation among churchmen on the following Sunday, but the gilt was rather taken off the gingerbread when Monday morning's papers announced that the whole thing was a hoax.

Now, how am I to even give you a faint account of the various picture galleries and exhibitions that I have been to during the past month? We seem to be in a regular fever over here about this sort of thing this year. On the site of the American Exhibition, we have a representation of Italy in London: there is to be found the Colosseum and Forum, etc., all complete for the sum of one shilling! The Director-General very kindly favored me with an order for the private view, and I have taken several notes which I hope to be able to put into readable form and send over to you shortly. At South Kensington, we have a Danish Exhibition; at Olympia, the wrongs of Ireland are to be brought vividly before the British public by means of a representation of an Irish village, in

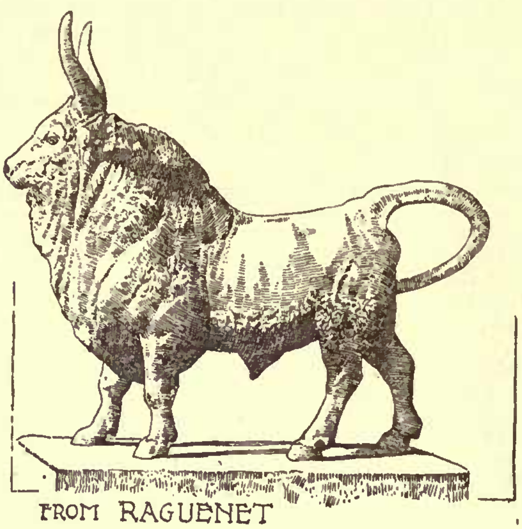
which the Irish round tower figures prominently, while at Westminster the art and science of France will be on view.

As regards the picture-galleries, here is the concentrated essence of my opinions: The Academy is, in most respects, a good collection; to be sure there are no pictures which can be called absolutel striking, but the quality of the general run is decidedly above the average; that is, except the architectural room which is bad, bad, bad. The Grosvenor has, I am sorry to say, disappointed me. Its individuality, I had almost said, its *raison d'être* has gone and it has sunk to the level of an ordinary picture-gallery. I hope for its own sake that it will recover itself ere long, but at present the scar left by the schism is unquestionably apparent. The new gallery must be counted an undoubted success. The general effect is very like what the Grosvenor was. The pictures are cleverly arranged, and the gallery itself is very conducive to comfort.

I am sorry to have to tell you that the inquiry into the conduct of the Metropolitan Board of Works is provoking some very painful disclosures. I send you a copy of the evidence at Friday's sitting of the Commission, but do not propose to comment on it while the matter is *sub-judice*. CHIEL.

PARIS GOSSIP.

THE SALON.—EXHIBITS OF THE DECORATIVE PAINTERS.—THE BEST OF THE PORTRAITS.



COMPLAINT was made last year of the great number of exhibits received at the *Salon*. The number was then 5,318, and this year it is 5,523, the paintings alone being represented by 2,586 canvases. If this thing goes on, where will it stop? In all these thousands of works how is it possible for one to be sure that some interesting work, hidden in the multitude of mediocre neighbors, does not escape notice? The evening before the day of opening—varnishing day—the Parisian journals give, room by room, the titles of the paintings that every Parisian ought absolutely to see. The public follows these indications, and run after the artists who are in vogue. The others wait patiently for a more serious criticism, aided by chance, to discover them and signalize their existence, or more impatient, they take steps to draw attention by any means whatever. The one most generally adopted is to treat at a large scale some subject proper only for an easel painting. The *genre* subject nowadays takes on the importance and dimensions of the historical painting; just as in a crowded room one raises his voice to make himself heard, so the artist increases the size of his painting in order to attract public attention and cause himself to be remarked. The critics have greatly deplored the evil which this does to art; but after all, is the evil so great? Surely the generosity with which the commonplace works are received encourages perhaps too many young men to adopt painting, and others who are not quite so young to keep on painting. Everybody nowadays in France of the bourgeois class practises or wishes to practise painting. Everybody pretends to have the right to the title of artist. It is, then, necessary for real painters to give proof of their superiority by a greater display of talent; and the great canvases, and even the commonplace ones, which are presented this year, give proof of serious work and interesting effort.

Decorative painting has been held in great honor for several years. The public buildings reserve much space for artists to decorate; châteaux and private hôtels indulge themselves more and more in the luxury of decorative mural painting. We find in this year's *Salon* a continuation of the decorations which are destined for the new Sorbonne: unfortunately the great composition of M. Puvis de Chavannes, whose cartoon was shown last year, and which it would have been interesting to see in its completeness and in color, is not shown. M. François Flameng, whose triptych at the last *Salon* attracted too much attention, sent this year his subject for the decoration of the great staircase of the Sorbonne, which is also a triptych, and of the same size as that shown last year, and which will be perfectly in harmony with that. M. Flameng seems to have done this one more rapidly and with less care in the details and the rendering. The middle motive, the most important, represents Cardinal de Richelieu laying the corner-stone of the Sorbonne in the presence of the architect, Lemercier, May 1, 1635. The composition is interesting: the principal and essential group forming the subject of the painting is not found in the first plane of the picture; Cardinal Richelieu and his *cortége* appear in the distance, and are seen from the top of a scaffolding which occupies the foreground, and upon which are grouped workmen and subordinate personages. The effect is very happy and very truthful. From the point of view of composition and *mise en scène*, so to speak, the ability of M. Flameng is great; but as I said just now, many of the details are sacrificed: the scaffold is badly rendered, and one of the workmen, who is very prominent in the foreground, has a head far too small for his body. The perspective of old Paris, running off into the background, is less attractive than that shown last year. The right-hand motive of the triptych shows the Rector Galland, accompanied by the deans of the faculty, going on the night before the Fête of the Purification to offer, according to ancient custom, a wax candle to Henry IV. The prince announces his intention of reforming the university. In the left-hand subject Etienne Dolet, Jacques Amyot, Rabelias, etc., symbolize the Renaissance. The backgrounds of these two paintings, particularly that of the right-hand one, representing the Tour de Nesles, are perfectly charming. M. Theobald Chartran has been entrusted with a fragment of the decoration for the same grand staircase. His Louis IX and Vincent de Beauvais at the Abbey of Royaumont is rather cold as a composition, but its tonality is in perfect harmony with that of M. Flameng—a very appreciable quality for the good effect of the combination in the same monument. These two artists have kept to a gamut of soft grays which harmonizes capitally with the architecture.

Very pretty is the decoration of Raphael Collin for the rector's dining-room at the Sorbonne. A young girl's figure, symbolizing the close of summer and holding in her hands a garland of wild flowers, is passing through a landscape of charmingly decorative effect. It is idealized after the fashion of Corot, and is in a gamut of blueish tones. To make an end of the decorations of the Sorbonne, it is necessary to speak of the large triptych of M. Benjamin Constant, which is destined to cover the panels of the hall of the Academic Council. I fear that the artist has deceived himself, and that even when in place his work will add nothing to his glory.

First of all one is surprised at the enormous dimensions of this decoration, and it is allowable, without waiting till the finished work is in place, to discover that it is too large in scale. It is developed in fact between pilasters, which figure on the canvas at full size and represent a colonnade which forms a rotunda in the middle panel. Now, these Ionic columns which must necessarily pass behind the pilasters of the hall are of a diameter equal if not greater than these pilasters themselves. Moreover, their loud reddish tone brings them still farther forward and makes them appear enormous. The columns have a bad effect, while the arrangement of the personages and the composition does not better the impression: women symbolizing Literature are seated all in the same plane upon the left; others, also seated, on the right symbolize the Sciences; at the centre, in the rotunda of the colonnade, still seated, are portraits of the principal personages of the Academy of Paris in voluminous red robes, and seemingly posing before a camera. All this is cold. All the heads, save two, being at the same height, make an extremely dry and disagreeable horizontal line. One need not, after seeing the decoration of M. Benjamin Constant go and see that of Paul Delaroche in the hemicycle of the Ecole des Beaux-Arts, but could M. Benjamin Constant, before he definitely settled his composition, have ever cast an eye upon it? The point of departure is not without its analogies: personages are grouped in a colonnade, but what movement! what variety of attitude! what admirable science of arrangement! without confusion and without complications. In the triptych of M. Benjamin Constant we find also a singular anomaly; the background of this portico, which is continuous through the three portions, is different. In the centre we see the silhouette of the Church of the Sorbonne, while upon the left and right are bossy woods. A little more consistency and regard for truth would not have hurt it. In spite of its faults, the decorative painting of M. Benjamin Constant is superior to that of M. Duez for the Salle des Actes—still at the Sorbonne. M. Duez, whose contribution last year was not very good, has sent one this year which is quite bad. His Virgil, promenading in the midst of violet-colored trunks of trees, is very unpleasant.

Decorative art is still further represented by M. Emile Bastien-Lepage, the brother of the painter who died in 1884, with a canvas whose general tone is agreeable, but whose aspect is cold and flat; by M. Lucien Berthault, with a composition called "Love's Question," where there are certain good qualities of drawing,—a naked woman standing is very well done. M. Ehrmann, in a decorative subject for tapestry, represents the official art, mythological and allegorical, well drawn, well composed, although somewhat confused, in which are found as figures Virgil, Homer and other serious people. This is very well, very neat, but without sentiment. Finally, M. Dubuffe *fils* evokes in the same glory the names of the three great poets, Victor Hugo, Musset, Lamartine. Winged females flit through the air in the midst of bluish smoke, through which can be distinguished the Arc de Triomphe and even the mounted horse-guards of Paris. The composition is perhaps a little "*jeune*," but

there are, nevertheless, good qualities from the decorative point of view.

A canvas which has had much success and gives evidence of an interesting effort in the field of great painting, is that of M. Albert Maignan, which represents the "Voice of the Tocsin." From an enormous bell, revolving at full speed, escape clouds of naked figures, a sort of demon, precipitated howling into space or clutching the bell-ropes, and announcing by their frightful cries the misfortunes which the tocsin generally foretells. In the background at the bottom of the picture is the sinister glow of the conflagration and the flag, to the defence of which the voice of the tocsin is calling. The figures, hurried along in their disordered fall, are mingled in an extremely able manner and the difficulties are overcome without effort. It is an interesting attempt at a style of work abandoned years ago and testifies to serious study and the accuracy of the painter's draughtsmanship. It is to be hoped that the medal of honor will be decreed to M. Albert Maignan.

Before speaking of architecture, I wish to mention the most remarkable of the paintings, the likeness of Cardinal Lavigerie, by Léon Bonnat; two very beautiful portraits by Carolus Duran, one very remarkable of his own daughter, the other of M. Louis Français; a beautiful painting by Edouard Détaille styled "The Dream." In it sleeping soldiers, stretched out on the ground, are enveloped in their blankets. The officers, with swords stuck upright in the ground, lend themselves also to sleep. The guns are stacked, the stillness of night envelopes the scene, and on the clouds unrolls itself (indicated in luminous transparency) the common dream of these men — victory, lofty deeds of arms, glory of the Fatherland. The idea is good but very difficult to render in painting. It is rather a subject for the poet, but M. Détaille has interpreted it in a very able manner. M. Fernand Pelez, in a painting called "Grimace and Misery," has depicted in a cruelly truthful manner those street mountebanks, so miserable in their tawdry apparel and so poignantly sorrowful under the factitious gaiety of their skylarking.

Finally, I wish to bear witness to the continued progress of the landscapists and to unite in the same eulogy the names of these masters: Pelouse, Rapin, Appian, Damoye, Petitjean, Nozal, Japy.

On reading over my notes on the architecture, I continually come upon the expression of regret at seeing this portion of the exhibition so deserted and neglected. Last year I questioned if this was not somewhat the fault of the architects. I ask the same question again, and yet in spite of the too great number of too serious and technical contributions, there are many pretty things this year which ought to interest everybody. I am decidedly of the opinion that the public distrusts itself, and much more time will be necessary to persuade it that architects are artists who exhibit works of art and not mere "*machines*" for the masons and carpenters. The public always turns back to the painting. That is their idol and amusement. There are images to the hand of everybody and which the crowd will always prefer, even if commonplace, to the other productions of art. It is as much as ever that anybody goes to look at water-colors or engravings. Our poor architecture is entirely neglected and sculpture itself owes, perhaps, a large portion of its success to the place which it holds in the garden, where it is very pleasant to go and get a breath of fresh air.

In spite of my special reservation in the matter of the large restorations of Roman monuments by the pupils at the Academy of France, I ought to cite, first of all, the restoration of the Palace of the Cæsars, by M. Henri Degland, and of Hadrian's Villa, by M. Charles Girault. I formerly took occasion to speak of the *envois* from Rome: I will only return to the subject for the sake of mentioning the recompense awarded to their authors. The medal of honor was decreed by unanimous vote to M. Deglane, M. Girault obtaining a first medal.

M. Jean Gonvers sent a very attractive study of the churches at Dieppe. Here is something to interest everybody. Architects discover just what they asked for in the sketch-plans discreetly included on the sheet, and the pen-work, united with the charming water-color, ought to attract the public. They are very good. M. Henri Rapine, in able water-color drawing, presents the fireplace of the Château de Cadillac. One of the most interesting contributions is unquestionably that of M. Ruprich-Robert, who sends some very interesting studies of the half-timber construction of the Normans, not only shown in complete restoration, but with numberless details, of the manor-house at Crève-Cœur; of the farm-house at Coin; that at Pipardière, and the Château de Granchamp — all these are very well presented. They are useful documents on the curious constructions of Normandy, which do not address themselves exclusively to architects. Every artist and every intelligent person ought to be interested in these works of M. Ruprich-Robert. Here, at last, is an architect who has discovered that it is possible to send something which is likely to attract the populace into the deserted halls of architecture; but, unfortunately, he is surrounded by the ordinary drawings, beautiful geometrical studies, very neatly rendered, but cold, always cold. Ah, if we only followed the example of some one like Ruprich-Robert, we could have, at least, one room made attractive with the always charming original composition of M. Robert Massy, and the charming studies for interior decoration of M. Alexandre Sandier. These are veritable works of art; these designs composed for the *Revue Illustree*.

I can now only cite like a catalogue the drawings or water-colors which depart a little from the dry and dull renderings of architectural drawings. Such are the pretty water-colors of M. Lucien Roy, M. Theo Landry, M. Louis Bonnier, and M. Ghesquier; the restoration of the Château Polignac, by M. Petitgrand; that of the Château de Montsoreau, by M. Réne Salleron, etc.

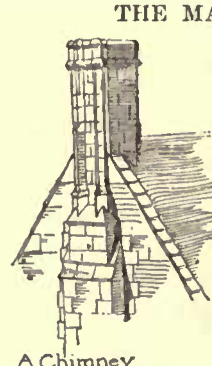
Finally, among interesting studies of modern architecture, is the project of transferring the present hall of the Eden Theatre, an open hall with promenade about it, into a hall fit for lyric and dramatic representations. M. Henri Schmit has acquitted himself admirably in this task. He could perhaps be reproached with not having taken advantage of the present hall. There is not much of the original left; and after all while mitigating in large measure the distressing ill taste of the present decoration, a little more perhaps of the general scheme might have been preserved. Except for this slight criticism (and criticism is always easy), this study is very interesting.

The reconstruction of the Opéra Comique has occupied M. Joseph Peigney, who has studied it on its ancient site with its façade on the Boulevard des Italiennes, and the result is not very successful. The plans are awkward, and the façade with a rotunda at the angle is not very happy; but it is conscientious work and not without merit.

And then to this list must be added the list of all of the school *projets*, which are deplorable and commonplace, and all the public competition drawings which can be placed in the same category. I should prefer not to mention any names, not even that of M. Bartholdi, who has sent to the architectural section a little model of a very inferior sepulchral monument to Paul Bert.

At the moment of closing this letter, the result of the vote for the medal of honor for painting are known. M. Edouard Détaille has obtained it, in competition with M. Benjamin Constant, one proof more that the medal of honor is awarded rather to the artist than to his work. M. BRINCOURT.

THE MARIA THERESA MONUMENT.


A Chimney
"The Builder

NO work of our time, probably, has been planned with more anxious regard to plastic and architectural greatness than the Maria Theresa Monument, which has just been unveiled in Vienna. The services and advice of the foremost native architects, sculptors, critics and historians were made use of. Zambusch, the sculptor who came off successful in the competition, had to remodel his sketch three times; to consult with Semper, and after Semper's death, with Hasenauer, in respect to its architectural features and their relations with the style of the edifices in the neighborhood; his Excellency von Arneth was appointed to furnish historical and antiquarian data, while the details of casting the bronze and of chiselling and oxydizing parts of the ornamental reliefs were prepared for and carried out with unexampled carefulness. What either South German art or industry can do has been accomplished. The monument is not only the ideal embodiment of a past historic period, it is, at the same time, an example of modern efficiency in metal-working and artistic creation.

The plan for the memorial dates fifteen years back, to 1873. Professor Zambusch, with his advisers and assistants, worked twelve years in carrying it out, the chisellers and smiths one year and a half — a short enough period for such great results.

The monument consists of the colossal portrait figure of the Empress on a colossal pedestal a hundred feet high, and of a base of proportionate dimensions. Both are adorned with accessory figures. The cornice of the pedestal is surmounted by four allegorical figures and its four sides with portrait groups and reliefs in bronze; the base by single standing statues below and in front of the reliefs, and equestrian statues at the corners. The base that would show in plan an almost roccoco manifoldness of curve in circumference, is oblong in section. In the first model the lines were simpler. Semper criticised them as being too stern to harmonize with the style of the new museums, and described the pedestals as standing "like a square tower, with an open doorway in the middle of each wall out of which figures emerge." I quote the criticism because it conveys a plain, if somewhat rough idea of the skeleton of the monument. In its finished condition, the expanse of base rises from steps in concave lines to the bronze equestrian statues. The pedestal is decorated with a pair of green serpentine pillars at the corners, and the "doorways" are set in rich frames that, besides the figures, are filled out with perspective backgrounds in bronze relief.

The market was flooded with prints of the statue of Maria Theresa before the monument was unveiled. It was known to be a seated figure, and the patriotic Viennese did not fail to call the attention of Berlin to the fact that she sits on her chair, not helplessly *in* it, like the two Humboldt statues in Unter den Linden. She is represented as having laid the sceptre and the Pragmatic Sanction in her left hand and arm for the nonce, to extend the right to the people. The statue shows her as she was in the early fulness of mature beauty and kindly majesty. It is more pleasant to look at than the run of similar effigies, besides being superior in artistic life and movement. She surmounts the great monument, not only physically by position, but with an essential architectural solidity that is admirable. The allegorical figures could be removed, the horsemen prance off and the groups walk away, but without the queen, the monument as such

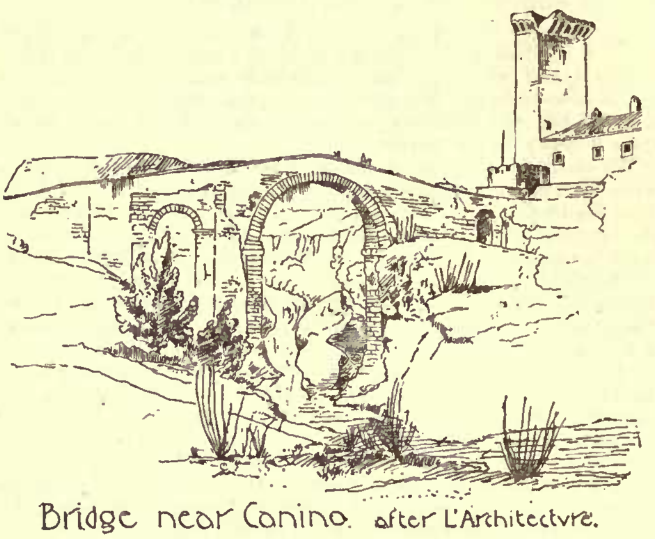
could not subsist. She thus not only gratifies the taste; the statue fulfils the highest architectural demands which we can make.

In respect to plastic excellence, the ideal figures are the best. Two, those representing "Steadfastness" and "Wisdom," are genuine masterpieces, not only the best Zambusch has created, but as good as any our times have seen. The first embodies less the persistent, obstinate side of steadfastness than the watchful and self-reliant. If the Empress had defended the Province of Silesia against Frederick the Great with success, and observed further aggressive movements of the enemy, the figure would represent the episode. It is a powerful female in helm and cuirass, seated, the body bent to one side, the right hand on the drapery of her lap, holding a sword, the left resting upon a low shield at her side. "Wisdom" holds the mirror of conscience. Like "Steadfastness" and the two other figures, "Mercy" and "Justice," the embodiment is that of maturity and power; the eye is sharp and observant, the head slightly bent in calm reflection; the flow of line is highly pleasing. But in "Steadfastness," the contours, besides being of sober beauty in themselves, add to the ornamentation of the monument by an exquisite assimulation in their lower part to the repose of the base, and above, to the life and action of the sovereign statue.

Native critics find that the horsemen are somewhat too far out from the pedestal. A detail, which the Viennese are too used to the sumptuous and *Baroque* to observe, is the dressing of the lower third of the pillars by bronze laurel wreaths that mount up spirally. That the effect of the monument should be made luxurious by the ensigns, drapery and paraphernalia of war and sovereignty is fitting; the period was one of war, and Maria Theresa and her court devoted to pomp. This spiral dressing to the pillars, however, is a touch in decoration too much. It is not mature exuberance. It is wilful fantasy, and should least of all have found a place on the supports of the chair of state.

Countess v. Krockow.

THE CORINTH CANAL.



Bridge near Canino. after L'Architecture.

ONE of the most interesting as well as difficult engineering undertakings of our times is that of cutting a ship-canal through the Isthmus of Corinth, and thus opening a new era in the trade relations of the whole Levant. This enterprise takes a peculiar interest to itself from the fact that the idea is such an old one and that it has been left to our day to carry out a project which interested the Greek republics and which troubled the brain of a Roman Emperor. The Isthmus of Corinth, which is about three miles wide at its narrowest place, connecting from time immemorial two busy seas, has always provoked the attention of shrewd-minded men. The old Greeks, with their small, flat-bottomed boats, quickly conceived the idea of a portage from sea to sea, and they facilitated this by constructing a rude sort of track, along which they dragged their boats on heavy trucks. The Romans, with their larger boats, saw the inconvenience and the waste of labor involved in all this and thought of a cutting through the isthmus. We know now that with their implements it would have been the most herculean labor of antiquity had they carried out the design. Even in our day of gunpowder and dynamite, the task has proved a most serious one. Your correspondent has had the satisfaction of looking over these interesting works and of talking with those who know most about them, and he is largely indebted for the following statements to Mr. Edward Rosenbush, the inspector of the Eastern Telegraph Company at New Corinth. Mr. Rosenbush is a Hanoverian by birth, who has spent most of his life in the Levant, having been at Malta for twenty-five years. He has won many distinctions and medals for services in the past and was especially serviceable to an American astronomical expedition sent out some years ago to witness a solar eclipse in the Levant.

While the canal of the Isthmus of Corinth will be of the utmost benefit to Greece, and while all the country is most interested in the undertaking, especially King George, the whole affair is in the hands of a French company. De Lesseps is getting to be a name to conjure by. The French company that has undertaken to pierce the Isthmus of Corinth was organized in 1881 under the honorary presidency of M. de Lesseps and with General Turr as president and resident manager of the work. The technical name of the company is "Société Internationale du Canal Maritime de Corinthe." The Greek government gave sanction to the undertaking and conceded the land for the canal, as well as all the uncultivated land on either side of the survey, with the single condition that the work should be carried through to its completion by the company, and that the Greek government should never be called upon for a subsidy. The actual work of digging began with appropriate ceremonies in the month of May, 1882. The capital of the company is 30,000,000 francs. The president, General Turr, is a man of great energy. He is a Pole by birth and fought under Garibaldi.

When the work was begun it was not looked upon as a very serious matter, but after several years of digging they came upon the solid rock that connects the Peloponnesus with the mainland. This proved to be a very hard quality of schist or granite, and very soon the contractors, who had not reckoned on this, were obliged to throw up their contracts and retire. This occasioned some delay, but those who had the matter in hand, nothing daunted, made a new estimate and secured new contractors, and in February last the work began again with renewed vigor. They are now making great progress, when we take into consideration the difficulties found in the materials they are at work upon. They are extracting 7,500 cubic metres of rock each day. They employ a corps of 2,800 men and fifteen engines, each drawing from sixty to seventy trucks. They are at work from one end to the other of the cutting, which stretches exactly 6,300 metres from sea to sea. The width is forty metres, and they intend to go down eight metres below sea level, giving the canal the same depth of water as is found in the Suez Canat. But the difficulties of cutting this canal are much greater than those that were found in constructing the Suez Canal. In that case it was a matter of digging out the sand of the desert; here it is a question of blasting. All night long explosions can be heard, and the day is spent in removing the débris. Gunpowder is found to be the best for blasting purposes, and dynamite for shattering the rocks. The highest point of the cutting at La Calotte is ninety-seven metres above water level. At this point the engineers have found their hardest nut to crack. On the average they have got down to a point fourteen metres above sea level, and hence the task before them is to go down through solid granite twenty-two metres more for a length of 6,300 metres. It will take three years at a most moderate estimate to accomplish this.

One of the satisfactory things about this work is that there is comparatively no sickness among the workmen, and the terrible experiences of the Suez undertaking, and the even more awful ones at the Panama are not repeated. Of course there are many accidents, as there are in any large quarry, and many cases of amputation. But the company has done everything it can to care for the sufferers. There is a regularly established hospital and a good physician resident. The 2,800 men are made up mostly of Montenegrins, Italians, and residents of Asia Minor. There are very few Greeks employed. As Mr. Rosenbush said, the Greeks are too lazy to work, and their highest ambition is to lounge around with cigarette in mouth, and let others do the hard work. This seems to be a rather extreme statement, and your correspondent has seen many indications of industry during his investigations in Greece, but it is certainly a telling argument against Greek labor when such a large company has to go so far to get good workmen. It is true the Greek prefers to live by his wits rather than by manual labor, and has no conception of the dignity of such labor.

At the western end of the canal, on the Gulf of Corinth, about two miles north of New Corinth, a town of about 3,500 inhabitants, are situated all the large depots and offices of the canal company. Here a new town is growing up called Isthmia, and in future will probably stretch all along the shore of the isthmus to New Corinth. The depth of water a short distance from the shore is thirty fathoms, and there are no drifting sands to obstruct the canal or the docks. There will be no such difficulty here as is found at Suez. The sides of the canal will be solid granite, and there will be no washing away nor necessity of dredging. The largest docks will be at the eastern end. The tariff of the canal will be put down at a low figure, so as to catch all the coasting trade, and it is fully expected that, in spite of the great expense of the work, it will pay well in the end. Certainly the world will have a new debt to French enterprise, and especially to the genius of M. de Lesseps, without whose influence this difficult piece of engineering would not have been undertaken, certainly not without the precedence of the Suez Canal. — *New York Tribune.*

How French is Understood at the Post-office. — "The following amusing incident may give something of a shock to those who so loudly vaunt the quick intelligence of our post-office authorities," says the *Pall Mall Gazette.* "A few months ago the Council of the Royal Institute of Painters in Water Colors elected a foreign lady — the flower-painter to the Queen — as an honorary member, and the Secretary duly sent her notification of the fact. About six weeks ago the lady, who lived abroad, wrote to accept the honor, addressing her letter to 'M. Everill, Secrétaire de la Société Royale des Aquarellistes.' Only the other day it reached its destination, being covered back and front with post marks and endorsed, 'Not known at the Royal Aquarium.'"

ALUMINIUM.

Porch, St Mary's, Leicester, Engl.

THE relief that the Emperor Frederick is said to have experienced from the substitution of a respiratory tube of aluminium for the previous apparatus made of silver has called public attention throughout Europe to the characteristics of what may almost be termed a new metal. Of course it is needful to remember the caution that *post hoc* is not necessarily *propter hoc;* but, in point of fact, the bulletins have given better accounts of the august sufferer since the change was effected. And it may be readily understood, even by those who have neither surgical nor mechanical knowledge, that the saving of three-fourths of the weight of any apparatus artificially introduced into the human body cannot fail to afford relief to the patient. The objectionable character (owing to its weight) of silver for the purpose is indeed admitted by the occasional use of vulcanite for similar tubes. But here, while weight is saved, bulk is increased. Again, aluminium is practically inoxidizable, even at high temperatures, except by hydrochloric acid; and the oxide when formed is harmless and inert, being nothing but a very pure clay.

Next to silica, alumina (which is the oxide of aluminium) forms in combination the most abundant constituent of the crust of the earth; namely, clay, which is a hydrated silicate of alumina. Lavoisier, the French chemist, first suggested the probability of a metallic basis of each of the alkalis and earths. Twenty years later Sir Humphrey Davy verified the theory by producing the metals sodium and potassium, and afterwards obtaining the bases of lime, strontium and barytes. But the inert earth alumina resisted the action of the voltaic pile and the other agencies which Davy could control, and twenty years more passed before the chloride of aluminium was obtained by Oerstadt. At last, in 1846, Wöhler succeeded in obtaining minute beads or globules of aluminium by heating a mixture of chloride of alumina and sodium. Deville afterwards conducted some experiments for obtaining the metal, at the court of Napoleon III, and an expenditure of £1,500 was awarded by the fabrication of two bars of aluminium. The process of manufacture was afterwards so simplified as to allow of the production of the metal at about eight shillings an ounce. It was manufactured from common clay, about one-fourth of the weight of which consists of the metal. In 1855, Rose announced that aluminium could be obtained from cryolite, a mineral found in large quantities in Greenland. It was imported into Germany under the name of mineral soda, and used in the manufacture of soap, and also for washing purposes. Cryolite consists of a double fluoride of aluminium and sodium. When mixed with an excess of sodium and heated, the metallic aluminium separates. It costs by this process about sixteen shillings a pound — half for materials and half for the labor and expense of the process. In the same year the *American Journal of Science* contained an account of what was called the electrical furnace, in which a continuous high temperature was obtained by introducing a material of high resistance to conductivity into the circuit of an electric current. After many trials coarsely pulverized carbon was selected, both for maintaining resistance and as a reducing agent for the oxides operated on. When a mixture of carbon with the oxide to be reduced is made part of an electric current in a fire-clay retort and subjected to the action of a powerful dynamo, so high a temperature is obtained that the whole contents of the retort are completely fused. Lumps of lime, sand, and corundum were melted, and crystallized, on cooling, in well-defined forms.

By what is called the Cowles process (from the inventor of the electric furnace thus described) aluminium is now produced at the net cost of 1s. 8d. per pound. Owing to its bulk being three times as much for equal weights, aluminium at 1s. 2d. per pound would be cheaper than copper at 5d. per pound. Possessed of the rare qualities of indestructibility, freedom from tarnish, strength, and lightness, the purposes to which aluminium will be applied, if it can be obtained at a lower price, are innumerable. And, as we have already seen, its cost has been reduced from eight shillings an ounce to twenty pence a pound, and it may be hoped that we are far from having reached the lowest limit of cheapness in production. As the electric agency has now been satisfactorily yoked to the retort, we may hint that Scotland, or some other district where water-power may be economically applied to the driving of the dynamo, is not unlikely hereafter to form the scene of a new metallurgic industry.

The Oriental ruby consists of nearly pure alumina in a crystalline form, containing but 1 per cent of oxide of iron, and ½ per cent of any other substance. The specific gravity of this precious stone is higher than that of many other gems, ranging from 3.9 to 4.2. It is remarkable that the same chemical element should form one of the heaviest of gems and one of the lightest of metals. Pure aluminium has, when cast, a density of 2.56; when forged, of 2.67 — or only one-third of that of forged steel, or a fourth of that of silver. The melting point is at about 1,300 degrees Fahrenheit. The metal is the best conductor of heat and of electricity that is yet known; so it may be considered that it approaches more nearly to some of the most important characteristics of the structure of the animal skeleton than any other metal. Its tensile strength is much greater than that of steel; so that it is possible not only to reduce the weight of an apparatus to one-fourth of that of one of corresponding size in silver, but to effect a further reduction by using a thinner plate of metal for the same purpose.

As an alloy for other metals aluminium possesses qualities no less valuable than when pure. Mixed with 10 per cent of tin it can be readily soldered, and takes a fine polish. Mixed with copper and nickel, under the name of aluminium-silver, it makes excellent cutlery, which will take an edge like steel. Added to ordinary brass up to the proportion of 10 per cent, it improves the color, the durability, the tensile strength, and the resistance to corrosion of the alloy. Mixed with bronze in the same proportions, it gives a rich gold color; and, with a specific gravity of 20 per cent less, the alloy has a tensile strength of 30 per cent more than the steel specified for guns by the English and German governments. Combined in smaller quantities with steel or iron it produces extraordinary effect, tripling their tensile strength, and increasing their resistance to rust. Added, in the low proportion of one part in a thousand, to Siemens-Martin steel, it reduces the melting-point, increases the fluidity, and consequently enables the founder to produce sounder castings. It has been announced that the age of iron is to be followed by an age of steel; but there is sound reason for anticipating that the twentieth century may prove the age of aluminium. — *St. James's Gazette.*

COMMUNICATIONS

A REALLY GOOD SUGGESTION.

PHILADELPHIA, PA., June 14, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — We beg leave to thank you for the article published in your issue of June 9th in the shape of a letter from F. S. Allen, architect, and we trust that all honorable architects will take the same course in future, and thereby do a great service to that class of material-men who have straight goods to sell, and who desire to put them honestly on the market.

We read all architectural journals carefully, and we do not know when we were more pleased than in reading a recent article in the *Real Estate Guide,* of Philadelphia. We wish that every architect in the land would find time to read and inwardly digest the statements there made, as we find in our intercourse with architects so many are fearful of using a good thing by itself, simply from the fact that wrong motives may be imputed for so doing: others claim that "they have no right to use a single article that would tend to create a monopoly."

Our experience in the past five years has been very great with the architects throughout the country, and we believe that they will compare most favorably with any other profession in the country; at the same time we know that they could better themselves and their clients, if they would take a little more care to look into the matters, and find out not only what they can of the article that is presented to them, but of the character of the house presenting the same. We do not wonder that architects as a rule are disgusted at their time being taken up by some classes of material-men. But were they to close their doors to new inventions and improvements, they would finally find themselves out of business. Many of them do give a great deal of valuable time, when their time may be saved to themselves and their clients by adopting a different course of business. It has suggested itself to us that were we to call at an architect's office, he could easily inform our representative, that he had no time in business hours to give to material-men in his own city, but if the architects as a body, would appoint one or two evenings a month, or give notice once every three months, that they would all want to receive suggestions or information from the representatives of the different classes of material which enter into the construction of buildings, this would bring before them all those who had anything to say in their special line, and what might be said by one against the material of another, would be openly done and in the presence of the whole body. Hence statements would be much more carefully made, and questions could be asked and the architects as a body could more easily discover the true value of the material under discussion. We think that if some arrangement of this sort should be adopted and these meetings were generally known, and the architects should refuse admittance at their offices to material-men, that it would bring about the most excellent results, and the architect and property owner would be largely the gainers. These suggestions, it seems to us, might be easily carried out, and we fully realize that it is more difficult for the architect to-day to decide which material is best in many cases, as every one claim theirs "to be the best."

This letter is not written by us with any desire to dictate, or with any view to publication, but knowing the many difficulties that architects lie under, we trust that these suggestions will meet with your approval in some way. Yours very truly, MERCHANT & CO.

[IN everything but the implied suggestion that architects should regularly act as audiences at a disputing match between dealers in kindred materials, we consider this a most admirable suggestion which could be put

into operation by the many architectural societies to the great benefit of their members. The architect who churlishly refuses to allow a commercial traveller to exhibit his specimens or to give him a reasonable chance to exercise his loquacity is false to his own interests and those of his clients. As a rule, architects are willing to be courteous and give an agent a fair hearing; but unfortunately there are many agents who do not appreciate that they are dealing with men who do not require a torrent of useless words poured over them before they can see the merits of the device or material offered for examination. A public hearing would be as useful to the manufacturers and much less wasteful to the architects. — Eds. American Architect.]

"DIAMOND CUT DIAMOND."

Chicago, June 12, 1888.

To the Editors of the American Architect: —

Dear Sirs, — In your issue of June 9, you publish an article "Chances for the Morally-Infirm," in which F. S. Allen, architect, encloses you letters from three firms which offer him a commission. We enclose a written postal card in which a discount to architects is solicited. You are at liberty to publish the enclosed postal, also our letter, if you wish. Yours truly, McCully & Miles.

Streator, Ill., March 17, 1884.

Gents., — I am in want of nearly 2000 feet of stained glass this year. Please send me your pattern-sheets, price lists and state lowest possible discount to architects. What is your lowest price for irregular work in cathedral glass (not stained).

Yours respectfully, F. S. Allen, Architect.

REPORTING BUILDING NEWS.

New York, N. Y., June 12, 1888.

To the Editors of the American Architect: —

Dear Sirs, — Is it considered a desirable thing by the profession in general to fill up blanks of *trade* newspapers with information as to projected buildings? I frequently have agents call upon me to do so and do not wish to be discourteous but have an idea that it is likely to make trouble for both owner and architect in some cases, by irresponsible men forcing themselves upon the owner through obtaining advance information. Yours truly, Inquiry.

[In a general way we believe that men who seek to surround their affairs with an impenetrable "Chinese Wall" are likely to find it encloses too circumscribed a field for them. At the same time we quite sympathize with any one who feels tempted to make a practical protest against that friend of the public but too often foe of the individual, the interviewer. A wise discretion such as an architect exercises in other cases should enable him to withhold from publicity facts which for one reason or another ought to be withheld. — Eds. American Architect.]

TO TAKE A DOOR OUT OF WIND.

New York, June 19, 1888.

To the Editors of the American Architect: —

Dear Sirs, — In answer to Architect's query relative to taking veneered doors out of wind I would suggest to him one of the following simple methods:

1. To rip each stile in the centre in the direction of its length and after jointing the sawn edges glue the pieces on reversed or end for end. If the rails be not crooked or twisted this may straighten the stiles.

2. Take the veneering off the hollow side of the crooked stile and make an incision with the chisel or saw half way through and across the core. Then put a pressure on each end of the stile and straighten it and insert a hard wood wedge in the incision. A similar treatment will straighten any of the rails or mullions but the veneering must be removed. Might I add that a difference between the natures of the veneer might cause the warping your correspondent mentions. If new mouldings be cut in tight to the panels afterwards they will serve to retain the door in position.

Yours truly, Owen B. Maginnis.

NOTES AND CLIPPINGS

Versailles in Decay. — M. and Mme. Carnot had thought of going to spend the Summer at Rambouillet, but as they find it would take £4,000 or £5,000 to make the château there habitable they have decided to rusticate at the Grand Trianon, which they visited yesterday to ascertain to what extent it was habitable. Versailles is falling into a state of ruin. The statues there are moss-grown, water infiltrates into the arches of the orangery from the terrace above. The southern wing of the palace has so gone to decay that large stones often tumble from the cornice and the roof is hardly a protection from rain. The cost of thorough repair would be too great for the Budget Committee to entertain it. All that for the present can be done is to check the progress of ruin. — *London Daily News.*

Burning Brick with Oil. — Many experiments in burning brick with oil in place of wood are being made by manufacturers of brick along the Hudson River. If the new method proves to be practical it is estimated that there will be a saving of 40 per cent effected. The main difficulty is in the "drying off" process. One result of using oil instead of wood will be the preservation of thousand of acres, of forests in the counties of Greene, Sullivan, Delaware, and Ulster.

TRADE SURVEYS

Building activity has rather suddenly subsided somewhat from its spring proportions in a number of Western cities. In towns and in many country places there is no cessation. There is a great deal of new work in progress and contemplated this season along the lines of the Northwestern and Southwestern railroads. The railway companies themselves are deeply concerned over dividends, but the people are enjoying lower freight rates and feel contented at the prospect for permanent reductions. State railroad authorities are using their statutory powers in the same direction. One trouble on much of the Western mileage is, that it has been built with capital paying six or seven per cent interest. The people feel that this is an indirect tax upon them, and hence their position of apparent antagonism to the railroads. But be this as it may, the expansion of building and of manufacturers in these new sections is creating a demand for money-enterprise and manufactured products which is helping to keep the wheels turning faster in the farther East. The wheat-growing area of the Northwest possesses a vitality which no ordinary influences can restrain. The situation of the Northwestern lumber markets carries out the statement. Large supplies are being pushed Westward. Extensive supplies of iron and other material are being hurried forward, and as far West as Omaha there are indications of building activity that are encouraging. Houses are going up rapidly in Western Pennsylvania, and in Ohio and Indiana. In localities in Iowa, Missouri and Arkansas builders are busy. The prosperity of the South calls for no qualification. Lumber stocks, North and South, are kept low. Planing-mills and shingle factories also have been busy, but the Western supply of shingles is now extraordinary, and prices have broken. The woodworking-machinery establishments are not overrun with work, but machinery-makers, in general, are busy. Car-builders are now running out of work, and competition for new work is very active. Locomotive-builders are beginning to feel less pressure for forward work, yet no general disemployment of mechanical labor is probable. Nearer home it is evident that there is cause for complaint only in spots. The paper-makers are realizing good prices for a maximum output, and there is a quite general movement in the direction of an enlargement and improvement of capacity. The boot and shoemakers are all busy, and have excellent trade prospects. Textile-goods manufacturers in cottons are doing well. Hosiery interests are flat, woolen dull. Southern textile-mill dividends continue to attract new capital. Southern iron-makers are shouting lustily over the position they find themselves occupying with reference to Northern competition; freight rates on iron have declined twenty per cent on several thousand miles of railroad. Southern lumber interests have been crowding their advantages perhaps a little too earnestly, and there is a weakening tendency in prices resulting from the large supplies precipitated upon a moderate market. Architects in commenting upon the probable course of building activity in the newer sections of the country say it will be only a short time before the services of architects will be in much more general request. The bulk of existing contracts are for common work, calling for no special or technical skill, but the Northern investors are more in the habit of consulting and following engineering and architectural talent in all kinds of work than the native Southerners. Just at present legislative and political influences are scattering the attention of business men from work in sight. Authorities among builders assert that when disquieting influences have subsided an active building season will set in. This refers more particularly to the region West of the Alleghenies. East of that dividing line very few new enterprises of magnitude will be entered upon. There is some dulness in Chicago and St. Louis, but this is compensated for by greater activity in country districts. The production of coal is steadily increasing East, West and South. New enterprises are flocking to Natural gas centres and to cheaper fuel points. New coal mines are being opened West of the Mississippi, and the managers of most of the railroads of this section are completing preparations for enlarged machine-shops and repairing facilities. The Pennsylvania Company will discharge some few thousand of its employés gradually. The New York Central is reducing its force, and the Baltimore & Ohio has already done so. The Western iron-workers have offered to quit work for three months, but this offer will be declined as it would help to build up competing iron centres farther West and farther East. The iron trade shows no signs of improvement. The more or less serious trade depression throughout the country is doing no pronounced harm. Even the tariff discussion has its favorable aspects, and the necessary trimming will not be done until the people can have had abundant opportunity to decide what changes should be made. The people believe some general remodification is demanded, but so far the Congressional Kilkenny discussions furnish them with scant material out of which to weave conclusions that will command cool approval. The evidences of harm do not abound sufficiently in the popular judgment to warrant sweeping reforms, especially when they suspect the motives to be as much political as anything else. Failures are not multiplying, indebtedness is not piling itself into mountains, taxation is not felt to be onerous, and hence the masses are inclined to act with deliberation in the readjustment of duties. The pressure for a more enlightened system of revenue getting will not be realized until the elements of weakness and injustice in the present system are eradicated, whatever they are and wherever they may be found to exist. So far whatever repressive influences have accomplished have been in the right direction. The railroad-builders many months ago became frightened at their rapid railroad construction. The evil was not and is not in the extent of mileage, but in the high cost of borrowed money. Manufacturing has not been any more overdone than has railroad-building, nor will it be for years to come. The problem underlying uninterrupted production in all channels of industry is not in greater cheapness, but in a more scientific, and, therefore, more equitable distribution of products. Great Britain, which relies on cheapness, is being slowly beaten on one hand by the cheaper labor of Continental Europe, and even of India on one hand and by the more highly paid and finer labor of America on the other. Every healthful influence at work is broadening demand, increasing consumptive capacity, decreasing cost, improving quality and is opening more avenues for all kinds of activities. Capital is going a-begging. The people of the Old World are seeking homes in new quarters of the globe. Latent enterprise is developing itself in wealth-getting directions which were not dreamed of two years ago. The real significance of this outflow of peoples from old to new lands is not fully recognized. It involves the correction of hoary abuses enjoyed under the cloak of prescriptive right, and the liberation of the mind from the invisible confines which the spirit of cash has built up. In a decade or two the outflow will have assumed such proportions as will make the republicanization of three-quarters of Europe a theme for editors and writers to contemplate as possible. The practical and material progress which the world has made during the past thirty or forty years will soon be paralleled by an intellectual development that will lift it onto a wider and higher platform.

THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. XXIII. Copyright, 1888, by TICKNOR & COMPANY, Boston, Mass. No. 653.

JUNE 30, 1888.

Entered at the Post-Office at Boston as second-class matter.

CONTENTS

THE National House of Representatives the other day fell into a discussion on the Civil Appropriation Bill, one of the largest items in which was an appropriation of half a million of dollars for continuing the work on the Congressional Library Building. After a long debate, in which the cost of the building as now designed seems to have been complained of, a resolution was adopted, striking out the intended appropriation from the bill under consideration, ordering the work to be stopped, the Library Commission to be dissolved, and directing the Senate and House Committees on Public Grounds to invite competitive plans from "five eminent architects" for a Library Building, the cost of which should not exceed three million dollars. It is hardly likely that the Senate will concur willingly in this resolution, but, as the House has by tradition the right of originating appropriation bills, it can, by persistent refusal to vote means for completing the present building, perhaps coerce the Senate into some sort of compliance with its new scheme, which involves oppression and injustice only to a profession limited in numbers, and of no political influence, and will probably seem, to the Senatorial mind, not worth quarrelling about. The profession in question will do well, therefore, to seize the opportunity to define its own rights, and, by courageous action, to call public attention more sharply and effectively than ever before to the costly, discreditable and tyrannical system which now prevails in regard to the design and construction of public buildings. When the time comes, as it very probably will, for inviting "five eminent architects" to scramble for a chance of having something to do with the new Library, the Committee on Public Buildings and Grounds ought to be totally unable to find, not merely "five eminent architects," but a single decent member or attaché of the profession willing to pay any attention to the dishonorable proposition. All architects will remember, if the officers of the Government do not, that Mr. Smithmeyer, the present architect of the Congressional Library, won his position in fair competition, that he has done his best to do justice to his great commission, by devoted study of the problem, and attention to the execution of his plan, so far as it has been carried out, and is morally entitled to all the honor and profit to be derived from its complete execution. If he had been employed by a private individual he could undoubtedly only be dismissed or superseded by paying him the full commission of five per cent on the estimated cost of the building, less a fair estimate of his actual necessary outlay for draughtsmen's services in preparing his plans, and it is only through his misfortune in having to deal with a body perfectly irresponsible, amenable to no laws, and as careless of its own reputation as of the rights of the citizens whom it is supposed to represent, that it has been possible for him to be subjected to so gross an injury. The complicity of any reputable architect in such a scheme would be taken as a declaration that such treatment as is proposed for Mr. Smithmeyer would be considered satisfactory, as applied to themselves, by the rest of the profession, and the ignorant Congressmen and scheming contractors who combine to make the life of an architect in the public service miserable would be filled with exultation.

IT is time to give these gentry a lesson, and a better chance to do so has never presented itself in the history of American art, for architects now, by dictating the treatment which shall be accorded to Mr. Smithmeyer, can fix the treatment which the Government of the United States shall for all future time accord to the profession. No quibbling or pretence can disguise the fact that Mr. Smithmeyer is morally entitled to have the work for which he was employed completed. If Congress chooses to employ another architect in his place, or to suspend for an unreasonable time the execution of his plans, it can honestly do so only by paying him the full sum that he would have earned if they had been completely carried out The assertion, which we have known made, that Mr. Smithmeyer's design is not "artistic," does not alter the question in the least. Whether it is artistic or not, it was chosen by the authorities. If they wish now for something else, let them make the change at their own expense — not at his. We are quite ready to believe that a Congressional Committee, too ignorant to know a bad design from a good one, and too conceited to take the advice of better-instructed persons, may have selected the worst plan instead of the best, but this is anything but a reason why architects, after suffering one such wrong as this, should abet the Government in covering up its mistake by sacrificing one of themselves, and beginning afresh. On the contrary, by insisting on Mr. Smithmeyer's rights, and holding aloof from all attempts to violate them, the Government will be placed in the position of being compelled either to pay two architects for the same work, or to keep to its first choice, which it appears to wish to abandon. In either case the question will certainly be asked, whether it is not better policy, as well as better ethics, to choose architects more carefully, and treat them more decently, than has hitherto been the rule; and the answer, in the present state of general dissatisfaction with the management of Government building work, is likely to be a very favorable one for the profession. It would not be too soon, we think, for the great professional societies to make themselves plainly heard on the subject; and if their warning is disregarded, it should not be necessary to remind individuals that there is a question of right and wrong in such matters, and that no proposition is so frequently and unanimously affirmed in the profession as the one which brands as a contemptible scoundrel the man who intrudes himself into employment promised to another; while, as a point of policy, architects, by united and honorable action, have now an opportunity for establishing themselves in the respect and confidence of the public, such as will not soon occur again.

THE letter of Mr. Harold P. Brown to the *Evening Post* on the subject of alternating currents for electric lights, which we mentioned the other day, seems to have attracted great attention, and has been copied into many newspapers. Moreover, its publication has been followed by several letters from other electrical engineers, denying Mr. Brown's assertion that alternating currents are more dangerous than others, and claiming that he has a selfish motive in condemning them. Standing a little aloof, yet with a certain interest in the subject, as architects do, it may assist their appreciation of the merits of the discussion to remember that the struggle between the continuous and the alternating current is really one between two companies, or rather, groups of companies, who are engaged in the business of furnishing light for houses and other buildings by means of incandescent electric lamps. Of those employing continuous currents the Edison Company is the principal representative, and its incandescent lamps are fed by a current directly from a dynamo arranged to give electricity of low tension, or "pressure," as the electricians call it, but in great quantity. Currents of this sort require heavy

wires as conductors, to avoid the loss which would be caused by resistance in trying to force them through a small wire; but, with conductors of suitable size they are very little inclined to seek escape through other bodies, and, even if they should, they are harmless to living beings through which they may accidentally pass.

OF the corporations supplying incandescent lights on the other system the Thomson-Houston Company is the most widely known, but, as we understand it, the Westinghouse Company, and perhaps others, use the same method and work in harmony with the Thomson-Houston corporation. However that may be, the companies which use the Thomson-Houston principle are able, by a very ingenious contrivance, to supply incandescent lights from the same current, dynamo and system of wires that supplies their street arc lights, although arc lights are always fed by a current of very high intensity, while incandescent lights require one of low intensity. The Edison Company has never tried to supply arc lights, its currents being entirely unsuitable for them, and the Thomson-Houston plan of conversion, whether it is dangerous or not, is a very interesting piece of science. To illustrate the difference between currents of high tension and those of low tension, we may recall a scheme once gravely proposed in Connecticut, where a company was organized, we think, to draw lightning from the clouds during the summer and lay it up in huge storage batteries for use in incandescent lights during the winter. This idea seemed reasonable enough, until some electrician published a note saying that the amount of electricity developed in a flash of lightning would not keep an incandescent lamp burning more than a few seconds, and that the terrifically destructive effects of a lightning stroke, which, for example, we have known to plough up some two acres of ground in an instant, were due to the high tension or pressure of the current, which, if reduced to the low pressure of the Edison incandescent-light currents, would hardly be perceptible to a person through whom it passed. How near the exact truth this explanation may have been, we cannot say, but it seems to illustrate the difference between the old or Edison system, which employs only mild and tame currents, and the Thomson-Houston, which harnesses lightning and subdues it to the gentleness requisite for domestic service. This taming is done separately for each house by the "converter." Most people know that any current of electricity passing through a conductor which lies near another conductor, but insulated from it, induces in the second conductor an electric current. The character of the induced current may be quite different from that of the current which induces it, and a primary current of high tension may give an induced current of low tension, or *vice versa*. In the Thomson-Houston system, the arc-light current is taken through "converters," of which one is allotted to each house where incandescent lamps are to be supplied. In the converter the arc-light current runs near, but not in contact with, a loop of wire, which supplies the incandescent lamps in the house. By induction from the arc-light current, a current of low tension is set up in the incandescent circuit, suitable in every way for supplying the lamps. According to Mr. Brown, this system is dangerous, for the reason that the primary current, which is not only of very high tension, but alternating, and thus more likely to jump off the wires which conduct it, may, in his opinion, sometimes burst through the barrier of insulation which separates it from the incandescent circuit, and find its way to the ground, with fatal effect, through any inmate of the house who happens to touch the incandescent lamp. It is only fair to say that neither Mr. Brown nor any one else asserts that this accident has ever really happened, and in the converters the two sets of wires are separated by a thorough and careful insulation, protected so that it is very unlikely to be injured, and, as an additional safeguard, "lightning arresters" are put on both sets of wires, which will, if they act properly, prevent any excessive current from entering the house. As currents under high tension can be forced along a smaller wire than those of low tension, the cost of installing the Thomson-Houston system is less than that of the Edison, while the opportunity which it gives for operating both arc and incandescent lamps with the same plant is commercially valuable. Nevertheless, there is a strong prejudice against it. As we mentioned, the Board of Electrical Control of Chicago will not allow any alternating-current systems to be used in the city, and, although the Thomson-Houston representatives claim that this prohibition is simply the result of an unreasonable whim, they acknowledge freely that good insulation is necessary to safety with their system. Of course they conscientiously try to secure such insulation, but it may be desirable for architects occasionally to remember its importance, and to see that, where the Thomson-Houston or similar systems are used, the wires are not only of the proper kind, but are so placed that the insulating covering will not get worn off or injured.

SOMETHING more is told us about the great real estate crash in Rome by *La Semaine des Constructeurs*. It is notorious that Rome has been within the past few years greatly over-built, and hundreds of houses stand empty, for want of either purchasers or tenants. There is, however, a still more deplorable side to the story. In Paris, although two years ago building had so far exceeded the demand that there are said to have been whole streets in the new quarter of the city, lined with beautiful houses, without a single inhabitant, the houses were at least well designed and planned, and thoroughly built, and, although the necessities of the builders and mortgagees often forced them to sell or let their property at low rates, it was still valuable property, sure in time to command a reasonable interest. In Rome, however, at the time when the great speculation commenced, there was no proper building-law, or other efficient mode of regulating construction, and in the fever to build cheaply and quickly the ordinary rules of sound practice were neglected, and huge blocks of houses put up with such wretched material and workmanship that many of them came to pieces before they were done, and many others hold together precariously. In these enterprises an amount of money was sunk which seems to us almost incredible. The Italians are quite conscious of the advantage of combining capital in financial operations, and immense building corporations were formed, which raised money by the sale of stock, and undertook the purchase and improvement of real estate on a gigantic scale. As the fury of speculation began to wane, and the owners of new houses found themselves with their property idle on their hands, and mortgage interest to pay, the smaller operators, who had no resources for carrying the load, soon succumbed. The larger capitalists, and the incorporated companies, held out longer, and the banks from which they had borrowed the money for building, dreading lest the useless property should be thrown on their hands, strained their resources to advance more money, so that the builders might pay off their more pressing debts, and carry the houses along until tenants or purchasers appeared. When the funds of the banks were exhausted, an appeal was made to the Italian Government, which lent the banks nearly eleven million dollars, to be used in keeping the speculators on their feet. This lasted only a few weeks; then failures began again. The richer class of private builders were now the ones to succumb; the great corporations, helped partly by their own command of funds, and still more by the banks, which knew that their own ruin would in many cases be involved in that of their principal customers, held out longer, but the collapse came at last, and two immense corporations suspended payment almost at the same moment, one with unsecured liabilities of more than ten million dollars, outside of its enormous mortgage obligations, which, at the ratio of builders' mortgages to their equity common in this country, would be at least twice as much more, and the other with an indebtedness which is not stated, but which may be judged from the fact that at the moment of its suspension it had eighty large buildings in process of erection, work on which was summarily stopped. The first company alone employed at the time of its suspension five thousand men, who, with their families, were deprived of their living by a stroke of the pen, and the number thrown out of employment by the failure of the second company, that of the Esquiline, could not have been much smaller.

WE find in *La Semaine des Constructeurs* a recipe for staining pine wood in imitation of black walnut, which is simple, and may have a certain value. All that is necessary is to apply to the pine a coat of extract of walnut bark, dissolved in six parts of water. When this is about half dry, the wood is to be treated with a solution of bichromate of potash in water. This completes the operation, and the color so obtained is said to imitate that of black walnut so closely that only an experienced eye can perceive the difference.

NOTES OF TRAVEL.[1] — VI.

CINCINNATI.

THERE was a time, before people had begun to appreciate the possibilities involved in the use of natural-gas, when Pittsburgh could claim for itself the unenviable title of being the dirtiest city in the country. But we have changed all that now, and the Athens of America holds the first palm for sootiness and dirtiness, in all that pertains to atmospheric influences. There are abundant compensations, however, for, along with its sooty blackness, and its dark clouds of perpetual coal smoke, Cincinnati can claim what is in some respects the finest natural situation in the country. The city is built along the right bank of the Ohio, on a tract of land rising somewhat above the river, but surrounded on three sides by steep hills. There is everything that could be wished for in the way of natural advantages. The soil, to be sure, is sandy or apt to run to very tenacious and very disagreeable mud, but in summer, it would be hard to find a more beautiful city or one more closely surrounded with attractive suburbs than Cincinnati. Some day natural-gas may reach Cincinnati as it has reached Pittsburgh, and then we fancy its inhabitants will wonder why they were so long blind to the natural beauties about them. At present, it is almost impossible to obtain a general view of the city from any point. If one ascends the hill and looks down from the Observatory (sarcastically so named, no doubt) nothing can be seen but a vast cloud of dirty yellow smoke, through which the observer gets occasional fragmentary glimpses of the buildings below, looming up in a manner that is very weird and interesting to the imagination, but most disappointing to one who seeks to photograph the aspect of the city on his mind. On the other hand, when the wind is in certain directions the smoke is so dense over the city that from below one can see nothing of the hilltops. With such conditions it would seem almost impossible to expect that any architectural effort should be possible. The soot from the soft bituminous coal is everywhere, and is no respecter of materials or fabrics, so that the tendency in later years seem to have been to disregard any attempt at fineness of materials for exterior design, and to use simply the commonest kind of brick, and employ it in the simplest possible manner.

It must not be inferred, however, that Cincinnati is lacking in architectural effort. The city has claimed the title of the Athens of America. Bostonians might not be entirely ready to admit the justness of the appellation, but there is nevertheless, a very decided art influence in dirty, smoky Cincinnati, and its existence is best proved by the attempts to battle with the oppressive atmosphere, and to produce architectural beauty. One of the most notable of the commercial blocks is the Shillito Building, erected some years since from the designs of Mr. McLaughlin, a structure which does a great deal of credit to the profession and the city. Drawings of this building have been published in the past in the *American Architect*, and we fancy many of our readers are not unfamiliar with its appearance. It is quite pleasing in its proportions, and for a perfectly simple design is one of the best in the West. A design of this sort, that is to say, a store for a large dry-goods establishment, is always difficult to treat; the complication being increased by reason of the necessity for large openings in the lower story, which generally destroy any feeling of solidity in the design, and give the building the appearance of being raised on stilts. A certain stilted look is so universal a feature of such structures, that we come to look upon it as almost necessary, and do not realize how objectionable it is until we find a building like this one, where the construction is carried clear down to the grade and emphasized so as to give solidity to the design, without materially obstructing the required amount of light called for in the first story. Some portions of this building are unworthy of the general design, and the cornice is weak in its details; but there is a great deal of breadth of treatment in the massing of the windows and in the arrangement of the piers; and while such features as the cornice, the belt-course over the second story and the mullions and transoms of the second story windows are, perhaps, unfortunate in their treatment, the effect of the whole is very successful and pleasing.

Strangely enough, the best commercial work in the city judged from an artistic standpoint is that wherein brick has been used. The majority of the business buildings, certainly those which are the most pretentious in design, have been erected in stone; but had half the work in these been omitted and the quantity of good, honest brickwork increased, with, at the same time, a nicer feeling in style and proportion infused into the work, and a more complete disregard of what we are pleased to call practical considerations, the Cincinnati public architecture would easily rank with the best in the country, for there has been no stint in the expenditure of money, and where good materials were lavished so freely, it seems a pity that they were not justified by a better design united to less extravagance in work.

The new Chamber of Commerce which is being erected from the designs of the late Mr. H. H. Richardson, promises to be a great addition to the architectural wealth of the city, and it is so emphatically different from anything Cincinnati now possesses and so original in both its massing and its style that it cannot fail to have a decided influence upon the architecture of the city. Possibly we are not justified in saying so, but we somehow fancy that Cincinnati is inclined to be very conservative in its art growth, and to look with not very favorable eyes upon any importation of talent from the outside, even though it came in the form of such decided genius as Mr Richardson brought to his work. However that may be, there are few buildings in Cincinnati that do not owe their origin to home talent, and it is only right that it should be so. There is small satisfaction in going to a strange place to study the local architecture only to find, as is the case in several Western cities, that all the best work has been done by Eastern architects. Not that the work done in this way is not intrinsically satisfactory in every respect, but one has a feeling that it is better for a city to stand upon its own merits, and abide by the artistic merit of its own efforts, than to engraft foreign stock on the slower growth of home talent.

A number of years ago a wealthy citizen of Cincinnati in a fit of ill-guided enthusiasm presented the city with a monumental fountain

which now stands in the principal square of the city. The Tyler-Davidson fountain does not seem to us worthy of the praise which has been at times bestowed upon it. It is a very elaborate design rising in a wide basin from a basement of stone, adorned with single figures; above are four smaller basins flanked by groups of statues, with a crowning figure of Plenty rising over the whole and sprinkling a fine shower on the lower parts of the fountain from her outstretched palms. The conception lacks dignity and the proportions are not altogether pleasing, nor are the relative scales of the groups of statues

[1] Continued from page 148, No. 640.

satisfactory. We fancy Cincinnati could do better than this again if it tried, nor are we at all sure that the popular feeling that once rated the Tyler-Davidson fountain so highly has not subsided to the pleasant contemplation of a piece of work which might be a great deal worse, but was the best afforded by the times in which it was erected.

If any one will take the trouble to climb the steep bluff at the rear of the city, he will be well repaid for the pains by finding a most excellent art museum, perched upon the highest ground and commanding a magnificent view in all directions, sun, smoke and wind permitting. The collections of the Art Museum are quite restricted in so far as relates to the fine arts, but there are some most excellent collections of industrial art, fabrics, faïences, metal-work, etc., which have been selected with nice discrimination, and apparently are used to good profit by the Cincinnati art-workers. The building of the Museum itself is a very pleasing construction. It was erected from the drawings of Mr. J. W. McLaughlin.

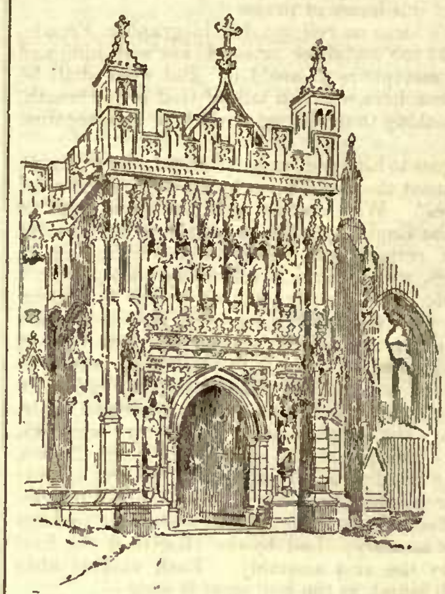
The Art Museum is a good starting-point from which to survey the suburbs of Cincinnati. It would be impossible in so brief an article as this to notice a tithe of the many handsome villas and residences scattered about the city. They are so far superior to any of the work in the city proper that one must see them in order to appreciate the art influence which exists in Cincinnati. There are also a few old Colonial residences within a few miles of the city, one of which was published in this journal a short time since. In the city itself there is comparatively little old work, though here and there one runs across a pleasing bit. The building occupied by the Liverpool, London and Globe Insurance Company is a good example of what might be achieved with English Classic of the style of Sir William Chambers, and is the sort of thing which could be developed into something a great deal better. As it is, the design is far above the average. It consists of a lower colonnade of heavy, rusticated Doric columns, and three stories above, each following the same arrangement of windows spaced regularly across the front and as close together as possible, while over every second window is a well proportioned pediment, the intermediate window being treated as a panel, a device which has often been used where the number of windows is too great for individual treatment of each bay, and where an appearance of solidity is desired. The building is crowned with a heavy cornice and balustrade. The proportions of the façade are rather pleasing, but the corners are weak, just as such a design is apt to be, there being no wide piers or wall-spaces to terminate the design. It is rather curious to notice that the device of putting pediments over the alternate windows was adopted by Mr. Richardson, in a very much modified form, for the new Chamber of Commerce Building.

There are a number of buildings in the same style as the Liverpool, London and Globe Building in Cincinnati, but they need to be sought out, as they have been rather overshadowed by the more modern creations. There are also a few very good granite church spires among the many which dot the city, such as that of St. Peter's, not unlike the spire of Park Street Church in Boston, though with a rather less pleasing effect. There is a church on Fourth Street worked out in very good Gothic in the style of the Strasburg Cathedral, if one may compare the little with the great.

One misses in Cincinnati a certain measure of the busy rush and roar, the continual excitement which is such a marked characteristic of most of the trans-Appalachian cities. This does not imply any cessation of growth or lack of potent and absorbing industries, but there seems to be a quieter feeling, possibly a reflection of the conservative element previously noted. It has not been in vain that the great Music Hall was built, and the Art Museum founded on the hilltop. Cincinnati may be moving slowly, but the civic taste is moving surely, and the people give evidence of a greater measure of æsthetic appreciation than is found in some cities which make far more artistic uproar. There is the opportunity to do the best of work in the Ohio metropolis. It remains with the local architects to show if they are equal to the emergency. B.

HOUDON'S BUST OF WASHINGTON.—The original model of the bust of Washington made by Houdon at Mount Vernon in 1785 has for fifteen years been the property of Mr. Wilson McDonald, the New York sculptor. The patrons of the Metropolitan Museum of Art in that city are anxious to have it placed there; but it has been deemed proper to give the Congressional Committee on the Library, which purchases works of art, the refusal of the bust. The great French sculptor, Houdon, was sent by Franklin and Jefferson to America in 1785, and was commissioned by the State of Virginia to execute a perfect likeness of Washington, the marble of which is now in the State-house at Richmond. Competent authority in art and on the portraits of Washington have pronounced Houdon's life-cast bust to be the greatest relic of Washington now extant. The only really valuable original picture of Washington is a likeness owned by the Government is the Peale portrait, now in the room of the Vice-president at the Capitol. The original head of Washington, by Stuart, is in the Boston Athenæum, and is valued at $75,000. It has been suggested that Congress could do nothing more worthy of the centennial of the inauguration of Washington as President, than to order the execution from the lines of Houdon's life-cast of a gigantic bronze bust, to ornament the grounds around the Washington Monument. The probability is that the original bust will remain in New York, and become the property of the Museum of Art.—*Boston Transcript.*

WHAT OUR ARCHITECTURE LACKS.



South-Porch · · Gloucester-Cathedral

WHATEVER is meritorious in our modern architectural work does not long remain unobserved and unknown, there being writers enough on art in this country waiting to proclaim all the virtues of its latest phases. The foreign visitor, also, has of late passed so many encomiums on our work that there is some danger of our becoming exalted above measure. Therefore a critical introspection now and then may be both wholesome and profitable in its effect on our future labors as building artists.

We derive a certain complacent satisfaction from the general admission of the foreign critics that our modern architecture is better than the modern architecture of any other nation, but, after all, is this a high standard with which to measure our progress? Our best efforts have been put forth in civil and domestic architecture. As a nation we have inherited the English rather than the French idea of a "home," and we have felt, in some degree, the influence of that movement towards beautifying the dwelling, which can be traced to the English artist painters. And yet great as our progress has been it must be admitted that a large proportion of our country houses are far from being beautiful. Our use of wood as a building material does not compare favorably with the half-timber work of Europe done in the sixteenth century. Our detail has too often a thin, cardboard look about it and we seem afraid to use much carving on the exteriors, some critics say, lest we be thought affected! But the chief fault is a lack of something interesting in the whole work.

When we can venture to compare our art with some of the older and admittedly noble work of Europe then will we see truly our position.

In ecclesiastical architecture our progress towards good work has been insignificant. The greater part of American church building is poor in the extreme. It appears as if the religious idea has never—so far as temples or churches are related to it—been decently habited. Unfortunately, we need not look far beneath the surface for an explanation. The result is only what might be expected from a people largely indifferent to religious thought and, as a corollary, without reverence. Let me illustrate this from personal experience. Some months ago I read in the *American Architect* a portion of a paper delivered at a church conference by a well known architect. He gave his views quite definitely and forcibly on church architecture. A church he argued should be a *church* and not a secular meeting-house, a place of worship not a place of entertainment. I was much struck at the time with the force of his remarks, but I hardly expected so soon to find a commentary on his discourse. Only the day following I went to the morning service in a new church in the fashionable Back Bay district of Boston. Behind the comfortable seat to which I was shown were some people talking evidently about secular matters. There was handshaking and much general conversation. Finally, the service began. The music seemed quite a feature and was chiefly confined to the choir of three or four young people who, nattily dressed, occupied a very prominent position directly over the pulpit. They warbled sweetly and frequently, so that at times one could almost imagine that a concert of sacred music was in progress, especially as the congregation were only once permitted to have any share in the vocal part of the service. The clergyman read a long string of notices, and made a mild attempt at a joke about one of these. He next suggested that a committee be appointed to transact some business, and, to my surprise, a bald-headed gentleman arose and named three or four persons. I felt apprehensive lest there might be a debate, but fortunately there was no dissent. Another member of the congregation seconded the nomination: it was put to the meeting, and carried. The choir followed with more songs, after which came a sermon of average merit.

Now the point I wish to bring out is, that the whole service was devoid of any reverential spirit. A hall would have seemed as appropriate a place in which to hold it, as a church. The sentiment voiced was, then: "The old idea of a church being sacred to the public worship of God has passed away, and we mean to let you know that, by transacting secular business or doing anything we like in it; we have no respect for old traditions." And the architecture of the building seemed something of an echo. The open-timber roof was fussy in the extreme. A modern painter had "decorated" the interior, but there was nothing in his work, either suggestive or

symbolic of any connection with Christianity, nor did it add one whit to the Churchly feeling of this house of prayer.

In speaking of Carlyle's ideas on religion, his biographer Froude, tells us the word God was too awful for common use with him, and he veiled his meaning in metaphors to avoid it. But what shall be said of some American preachers, who can talk of God in one breath, and in the next, say something that will set the whole congregation in a roar?

An American actress goes to England, and, in a certain play, dances, singing as an accompaniment the well-known hymn "We shall meet in the sweet bye-and-bye." Why do the audience show signs of disapproval? Because the English people have still some sense of propriety, some sense of respect, and object to the mixing up of sacred or religious things, with what is frivolous and secular.

Reflecting on the service in this Boston church brings to remembrance as opposite things will do, another service I had seen years ago. On a Sunday evening, in the autumn season, the great nave of an English Cathedral is filled with people. The dull gray interior is lighted by rows of gas-jets, but the lofty vault is dark, ending in deeper darkness as it stretches towards the central tower and choir. There is no color here save the old glass in the clerestory windows, now faintly lighted by the twilight, — mere patches of colored glass, tangled and mysterious in this light. From the high pulpit, against one of nave piers, the archbishop preaches an eloquent and impressive sermon. But the effect of the music, simple as it is, is perhaps the most lasting in one's memory. Led by the choristers the final hymn is sung heartily by the vast assembly. Each vaulted aisle seems to reverberate with sound, as the last verse is sung —

"Finding, following, keeping, struggling
Is HE sure to bliss?"

Above the voices the trumpet-like notes of the organ, in one grand crescendo, swell the refrain —

"Saints, apostles, prophets, martyrs,
Answer 'Yes.'"

In such a service as this the whole seems harmonious: the architecture is in accord with the form of praise, the æsthetic sense is satisfied. An artist would love to paint such a scene. Of how many church interiors and church services in this country can the same be said?

The spirit of the times is indeed lethargic in things spiritual and religious, and perhaps we may not have a noble church architecture until Christianity is endowed with new fervor, or crystallized into a new form.

Much has been said in disparagement of modern church architecture in England; — "Merely an archæological revival" says the superficial critic, who probably did not give a week's observation to the subject when abroad. A more thorough examination would show that there is much excellent work in this class of buildings. We find in the work of the best architects not only a dignified style, but in planning, the conditions of the site and the requirement of the various church societies have been honestly met and faithfully worked out. If to the mind of the critic the details are too closely modelled after the old work, the variety in plan and arrangement, the stained glass and the furniture of the church, are enough to atone for any lack of invention in mouldings. In the best work of modern Classical architecture, do not our architects repeat again and again the same Classic mouldings?

I have in mind a certain modern church, in the suburbs of a city in Massachusetts, built from the designs of an architect who had been educated in France. He evidently had resolved to do something "original," but the result, as most of his confrères admit, is a failure. There are hundreds of old parish churches in France and England, and we should have felt grateful if he had used any one of them simply as a model.

The changed attitude of modern thought towards morals and religion is most strikingly seen in the general exclusion from the walls of our building of any words that express moral or religious sentiments. The builders of the Alhambra in Spain wrought among their elaborate ornamentation verses from the Koran — the bible of the Mohammedans. On many an old house on that ancient street, the Cannongate in Edinburgh, we often come upon such lines as these carved on a tablet outside the "Shoemaker Close:" "Behold how good a thing it is for brethren to dwell together in unity." Amidst the present squalor and unsanitary surroundings of the locality, the words seem like mockery, and though history reminds us that in the early days, when these houses were built, cruel and unbrotherly deeds were common, still there must have been a reality to the religious beliefs of the people. If any one in these days were to revive this ancient custom, it would be looked upon as a mild form of lunacy. Imagine, for a moment, the effect on a Bostonian (of the very proper type), returning from summer travel to find that the decorator, left to complete his city house, had painted in the frieze of his library, such lines as these: "Whatsoever things are just, whatsoever things are pure, whatsoever things are amiable, whatsoever things are of good report, if there be any virtue and if there be any praise, have these in your mind, let your thoughts run upon these." — *Phillipians*, iv, 8.

This repugnance to any outward expression of religion or morality is often extended to any poetic sentiment in line or verse, and it is the more suprising to meet this in a city like Boston — "the Athens of America" — which is supposed to foster the muses. Can it be possible, that the poetry is confined to a cult wherein all is enthusiastic raving, whilst the souls without this circle live in a state of starvation, never reading poetry, nor considering it in the least needful for their growth humanly? There must be some truth in this supposition for such writers as Edgar Fawcett in speaking of poetry say, in the parlance of the store-keepers, "there is no demand for it."

I once had in charge an architect's pupil, in an English town, who had a great penchant for writing verses and reciting dramatic plays in the office, to the neglect of his drawing, but he became a good architect after all. A London architect in a recent article descriptive of Cornwall, its landscape and its old churches is quite imbued with poetic feeling. His architectural work, chiefly ecclesiastical, is most excellent.

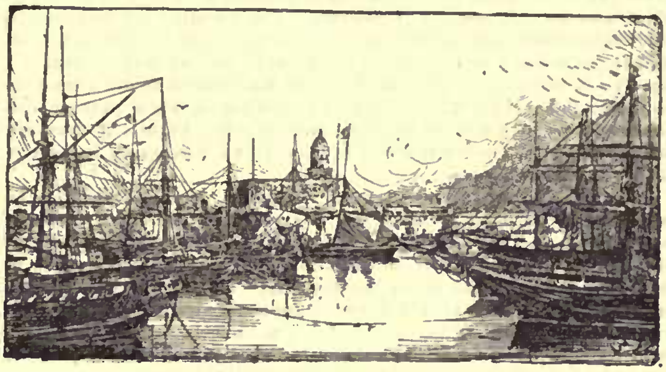
The late Edward W. Godwin, another English architect, used to speak much of the pleasure derived from reading Spenser's "*Færie Queene*." Lastly, one of the best and most successful of English workers in the decorative arts was first known to fame as a poet.

In making comparisons, one can only speak from personal knowledge and experience. So far as this extends, during a period of eight years in this country, meeting daily persons in the ranks of architectural work and practice, or in the arts associated with it, I have met few, if any, who showed sympathy or taste for poetry. This absence of poetic feeling impresses one as if the practice of architecture, viewed as a fine art, were altogether too much dominated by the commercial spirit, with its unlovely life, its haste and worry, than which nothing can be more at variance with the ideal artistic life: so that the poetic sense, if it even exist in a germ, is soon crushed out.

We may have fine buildings, as far as design and technical skill can carry us, but never great art, for without some infusion of the poetic element, and in religious art, without the sense for reverence, such works will pass to our descendants as the soulless creations of a utilitarian age. R. BROWN, JR.

AUTUMN JOURNEYS IN MEXICO. — I.

FROM THE CAPITAL TO VERA CRUZ.



Ulna, Vera Cruz.

THERE are weighty reasons why these should be *autumn* journeys. In the first place, some of them lead us down into the *tierra caliente*, the hot lands, where *vomits* and kindred diseases prevail and where the unacclimated can visit with safety only during the autumn or winter months. Secondly, at the close of the rainy season, about the first of October, there are apt to be, more than at any other time of the year, a succession of bright, clear days, delightful for travelling both in the highlands and low-lands of Mexico. November, most unlike a November in the more Northern latitude, was the month in which most of these journeys were taken.

A very good motive with which to have wandered from town to town in Mexico would have been to put to the test of personal observation the truth of the saying often heard in the Mexican capital, "*Saliendo de Mexico, todo es Cuauhtitlan*," (all outside of the city of Mexico is like Cuauhtitlan), or there is nothing worth seeing outside of the Mexican capital. Cuauhtitlan is a little Indian village about thirty miles from the capital, so much like hundreds of other Indian villages in the Republic that no one would ever think of visiting it were it not that the bull-fights, now prohibited within the Federal district to which the capital belongs, are still to be seen at Cuauhtitlan. And of late years a favorable place for the bull-fights has been found nearer the city, so that the fame of Cuauhtitlan now rests solely upon the oft-repeated maxim which I have quoted. I confess I was sorely tempted to visit Cuauhtitlan myself once, attracted solely by its musical name, but I withstood the temptation and have never yet seen the town which stands for all that is ugly, dull or uninteresting in Mexico. But while my chief motive in making these autumn journeys had little to do with the maxim of the locally-conceited residents of the capital, I succeeded in disproving it to my own satisfaction upon my first journey from that city. Yet nothing of beauty or interest which I found in other cities of Mexico could be to the disparagement of the capital. After having explored every nook and corner of it, I find myself even more appreciative of that city than many of its proudest residents.

The journey from the capital to Vera Cruz, over the Mexican railway, has been justly described as the most magnificent railway ride of a single day to be found anywhere in the world. Leaving a city elevated seventy-five hundred feet above the level of the sea, with two mountains, snow-covered throughout the year, in plain view, the road first ascends one or two thousand feet, then descends, passing through a temperate climate upon the mountain sides, and finally reaches the tropical lands of the Gulf coast. In descending the Eastern slope of the mountain range, the road exhibits some interesting specimens of engineering skill, and the scenery on all sides is grand beyond description. The attention of the traveller is wholly taken up by the varied scenes through which he is passing. The tunnels (seventeen in number) and bridges (almost innumerable) are principally located within about fifty miles of track, upon the mountain side. All the tunnels are built upon curves and one is upon a double curve of the road. Often the road is upon a narrow shelf midway of the perpendicular side of a rock of immense height. The names of the various localities is, somehow, suggestive of their wildness; Maltrata, Metlac, Infernillo (literally "Little Hell"), Chiquihuite, all these names are given to *barrancas*, or rugged canyons, around, over and through which the road winds. But it would be folly for me to attempt to describe this portion of the ride.

The departure from the city of Mexico is made about six o'clock in the morning. The building containing the depot and general offices of the Mexican railway in the city of Mexico is a fine specimen of modern Mexican architecture. It is of the fine, light-colored stone so commonly used in building there. It is a two-story building, with lateral wings of one story, and it unfortunately exhibits the character of the soil upon which the Mexican capital is built. The two-story building has settled several inches, drawing down the inner ends of the wings with it. The whole valley of Mexico is composed of a marshy, spongey soil, and large buildings invariably settle in this manner. Several of the old churches are considerably out of plumb. Were it not for this unfortunate accident to the depot building of the Mexican railway, it would be an imposing structure.

The journey is made by a "mixed" train — freight cars, third-class passenger coaches, and a coach divided into first and second class accommodations, the difference between the first and second class accommodations being cushioned seats, a little better company, and three dollars and a half between Mexico and Vera Cruz. A few Anglicanisms are noticeable in the management of the road even to the casual observer. It is only a few years since the English compartment coaches were withdrawn from the main line and they are still used on the Puebla branch, as we shall have occasion to observe before these autumn journeys are over.

Leaving the city, the road passes down a causeway built by an ecclesiastical viceroy towards the end of the seventeenth century, and having been designed for the use of pilgrims to the holy city of Guadalupe, there are fifteen beautiful monument-like structures at intervals along one side, dedicated to the "fifteen mysteries of the rosary." They are now rather dilapidated, but were originally exquisitely carved. This causeway is only a few yards distant from and nearly parallel with the ancient causeway leading from the island-built Aztec capital to the mainland. The second station from the capital is San Juan Teotihuacan, and the train passes within plain sight of the two pyramids which make the town of San Juan Teotihuacan famous. So far as known, these two pyramids are entitled to the names generally given to them, "the Sun" and "the Moon." San Juan is only twenty-seven miles from the capital and is one of the many points to which interesting excursions of a day can be made, and many such excursions are taken by amateur archæologists for the purposes of independent exploration. A visitor to San Juan has already contributed an exceedingly interesting paper to the *American Architect*, and it would be unnecessary to do more in this paper than present a view of the two subjects of so much archæological research, the only remaining specimens of the architecture of a race older, according to one of the greatest authorities on such subjects (Señor Orozco y Berra) than the Toltecs or the Acohuas.

Proceeding to Esperanza the scenery is uninteresting and the dust is apt to be extremely disagreeable. The guard calls out the name of each station and the number of minutes the train will stop there. Men and women are on hand when the train stops with various articles for sale. There seem to be fruits peculiar to each station,— some of them are seldom seen in the Capital even, and most of them retain their old Indian names. The stations of Ometusco and Apam, produce the best *pulque* of Mexico, better than any to be found in the capital. As the train passes through these towns the traveller can look out upon magnificent fields of the *maguey* (American agave or aloe), from which the *pulque* is made. And if he has lived long enough in Mexico to learn to like *pulque*, (for it is wholly an acquired taste to any but Mexicans), he can try a glass at each of the two stations, for the venders will be on band. At Apizaco there is an opportunity to take breakfast at ten o'clock, and at Esperanza dinner is served at one o'clock, for the traveller will have to leave Mexico with only a cup of coffee and a roll. But the coffee of Mexico is delicious and well sustains the traveller until the train reaches Apizaco. There is chance for another dinner at four or five o'clock at Orizaba. Before Esperanza is reached, the interest of the traveller will be taken up principally by his fellow passengers, who will be Mexicans of the better class, intelligent and sociable, experienced travellers in Europe but with scarcely any knowledge of the United States, — or rather an inclination to regard it as a semi-civilized land. The popular feelings in this country regarding Mexico are pretty generally reciprocated by the Mexicans. Both are founded upon lack of knowledge. Before the train has been underway for an hour the conversation in the train becomes general, so that the first one to leave the train has to shake hands and embrace all around and bid each traveller "good bye" and wish him a pleasant journey. Nor will the Mexican gentleman who has provided himself with an elaborate luncheon to be eaten upon the train, consent to partake of a single mouthful until he has invited each person on the train to join him. This politeness is characteristic of the Mexicans of every class.

At Esperanza the snow-clad peak of Orizaba is in full view, and it remains in full view during all the journey which follow this for the next seven or eight days. At Boca del Monte (the mouth of the mountain), a few miles beyond Esperanza, the really interesting part of the journey begins. The elevation is about eight thousand feet. A descent of twenty-four hundred feet must be made to reach Maltrata, distant twelve miles by road, less than nine miles in a straight line. In the same way the road descends to the elevation of fifteen hundred feet in fifty-three miles. Reaching the foot of the mountains it passes through tropical jungles by a gradual descent to the gulf. Orizaba is the principal town passed in this descent. From the train one can look out over its roofs of red tile, and see its graceful domes and spires. Córdova is in the midst of the coffee and fruit country. There luscious pineapples, bananas, oranges as well as other fruits peculiar to that country can be bought for a trifle. The locomotives, — Fairlie's double engines, — which draw the trains up and down these steep grades are a curiosity in themselves, and are worth the traveller's notice. They are used nowhere else in America, I believe.

Passing through the tropical country, — the *tierra caliente*, — one of the most beautiful sights to greet the eyes is a coffee plantation. Not that the coffee plant is at all attractive or anything else than an insignificant shrub, but because the young coffee plants are set out between rows of broad leaved banana trees, for the sake of the shade they yield. Thus the beauties of a coffee grove are really due to the banana trees.

Vera Cruz is reached about eight o'clock at night, so that the last part of the ride is made after dark. This is probably fortunate, as the country for many leagues back of Vera Cruz is flat and sterile, and would be likely to disgust the traveller after the magnificent scenery of the mountain sides. Arthur Howard Noll.

The Illustrations

[*Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.*]

HOUSE OF NATHANIEL THAYER, ESQ., BOSTON, MASS. MESSRS. STURGIS & BRIGHAM, ARCHITECTS, BOSTON, MASS.

[Gelatine Print, issued only with the Imperial and Gelatine Editions.]

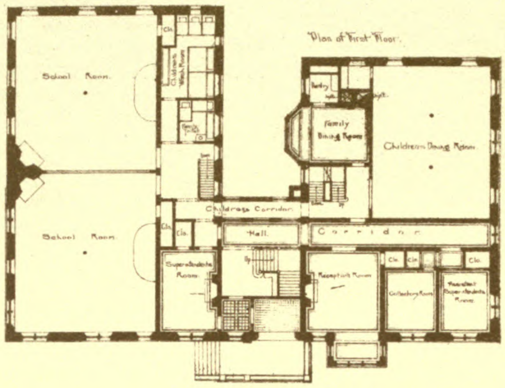
THE RATH-HAUS, BRESLAU, GERMANY, AFTER AN ETCHING BY BERNHARD MANNFELD.

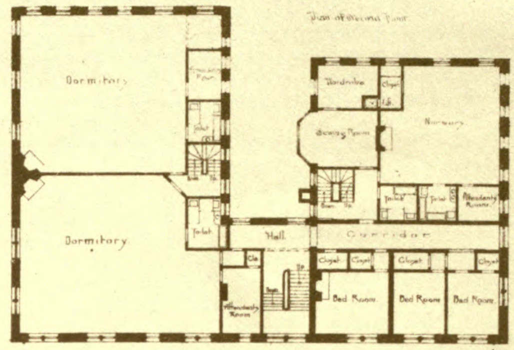
THIS fine old Mediæval town-hall stands in the Grosser Ring of Breslau, a large and busy city situated on the river Oder in Prussia. Its exterior dates from the beginning of the fourteenth century; the interior is in the florid Gothic of the sixteenth century. The whole has recently been restored. The "Princes Hall," the ancient assembly-room of the Silesian princes and their councils, is judiciously redecorated. Beneath the Rath-haus is a room, now used for a beer-cellar, which is also architecturally interesting. The Staupsaüle or "scourging-column" erected in 1492 in front of the building and surmounted by a figure wielding sword and rod, recalls the ancient modes of administering justice. Mannfeld, whose print of Cologne Cathedral, was published in the *American Architect* for April 25, 1885, has etched several other large plates, among them being one of Albrechtsburg, another of the "Artus Hof" at Dantzic, and a third of the tomb of Frederick the Great in the Garrison Church at Potsdam. He has also executed some series of views on the Rhine and elsewhere in Germany, a large part of his work being of architectural subjects. He was born at Dresden in 1848, his grandfather, Karl Scheinert the glass painter, being director of the drawing-school connected with the porcelain manufactory at Weissen. From him and from Georgi, a Dresden painter of Oriental scenes, he received his first artistic impulses, though he is mainly self-taught. He has worked in a stained-glass manufactory and as an illustrator and painter in water-colors. He travelled all over Silesia making drawings of old tombstones for Count Hoverden — a work which occupied him five years.

NEW KENT HOUSE AT LAKEWOOD, CHAUTAUQUA, N. Y. MR. E. A. KENT, ARCHITECT, BUFFALO, N. Y.

THE old house was burned Oct. 1887. The new house has about 150 bed-rooms. Dining-room, 25′ x 150′; seats 800. The office is designed as an assembly-room, and has a promenade deck-roof

COPYRIGHT 1888 BY TICKNOR & Co.



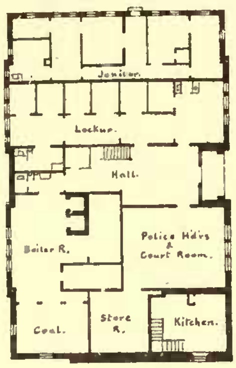


Front Elevation
Proposed Home for Little Wanderers. as submitted by.—

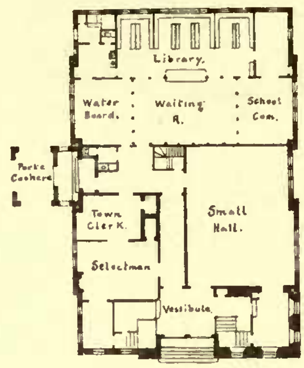
E. C. Fisher. Architect.
Boston. Mass.

Heliotype Printing Co. Boston

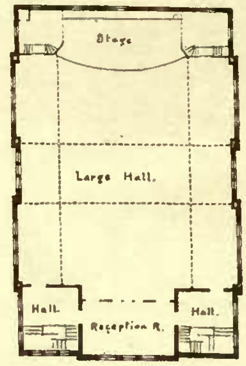
COPYRIGHT 1888 BY TICKNOR & CO



BASEMENT.



FIRST FLOOR.



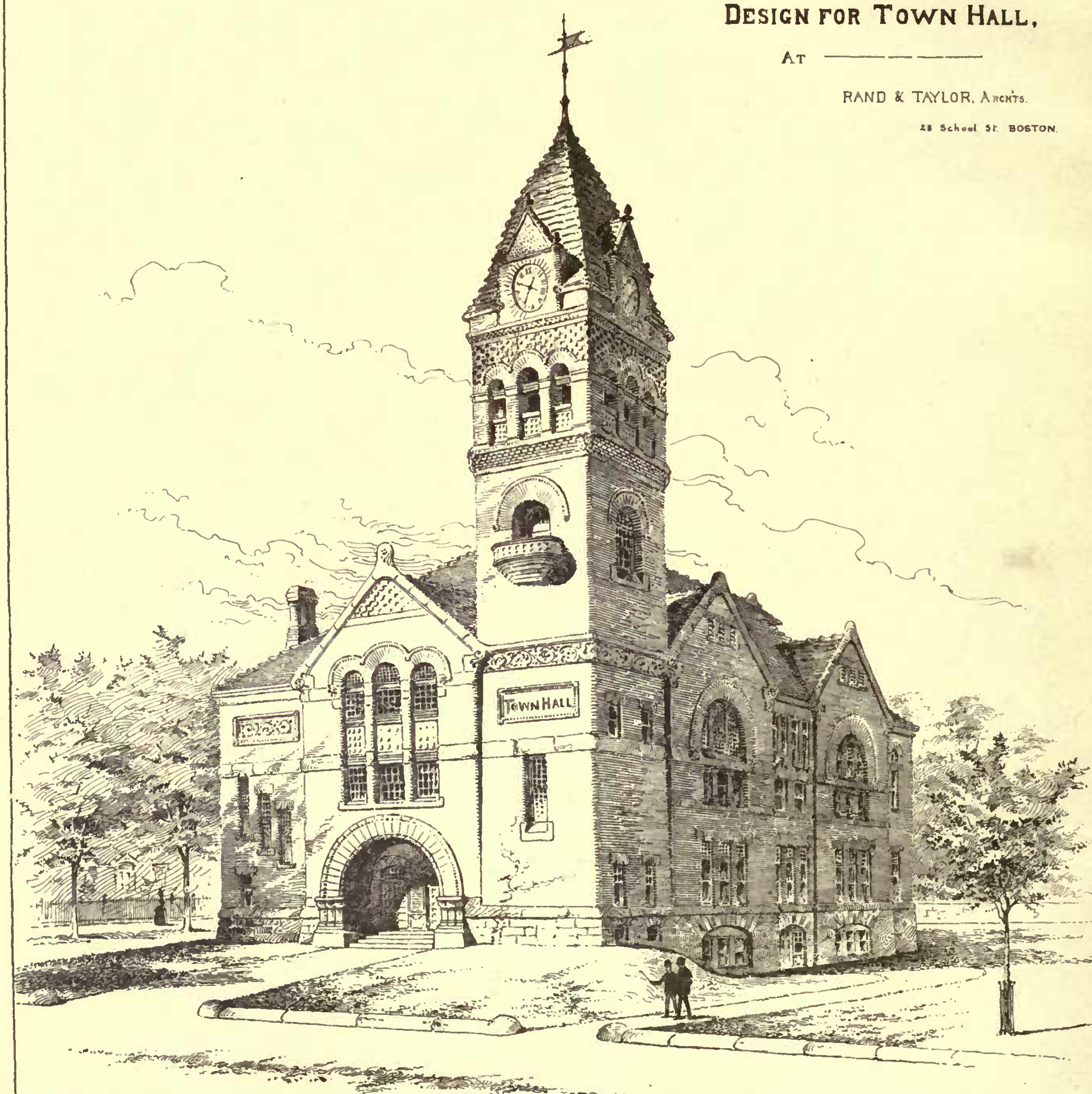
SECOND FLOOR.

DESIGN FOR TOWN HALL,

AT ——————

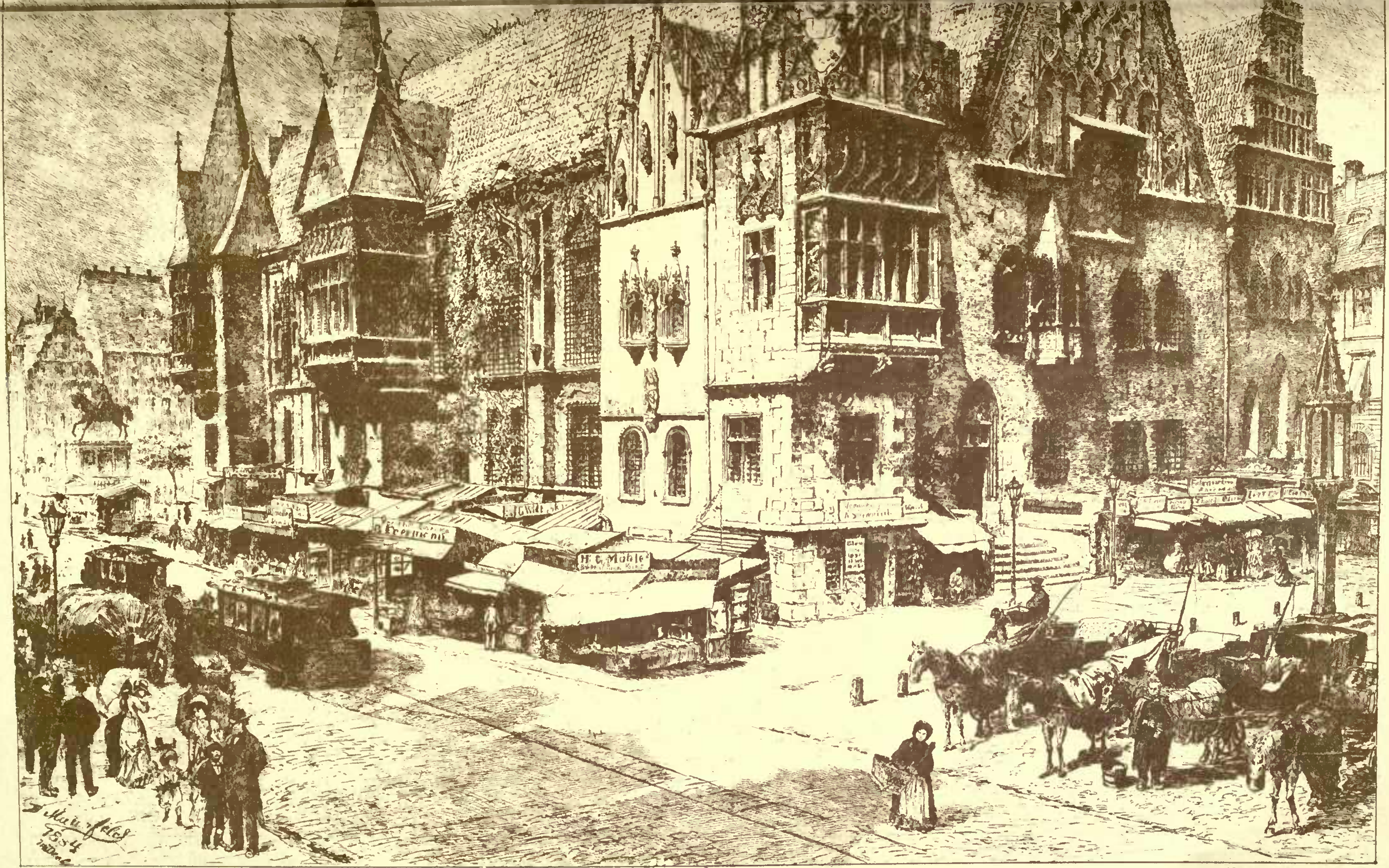
RAND & TAYLOR, ARCH'TS.

28 School St. BOSTON.



Jno W. Robbins Del.

Heliotype Printing Co. Boston.



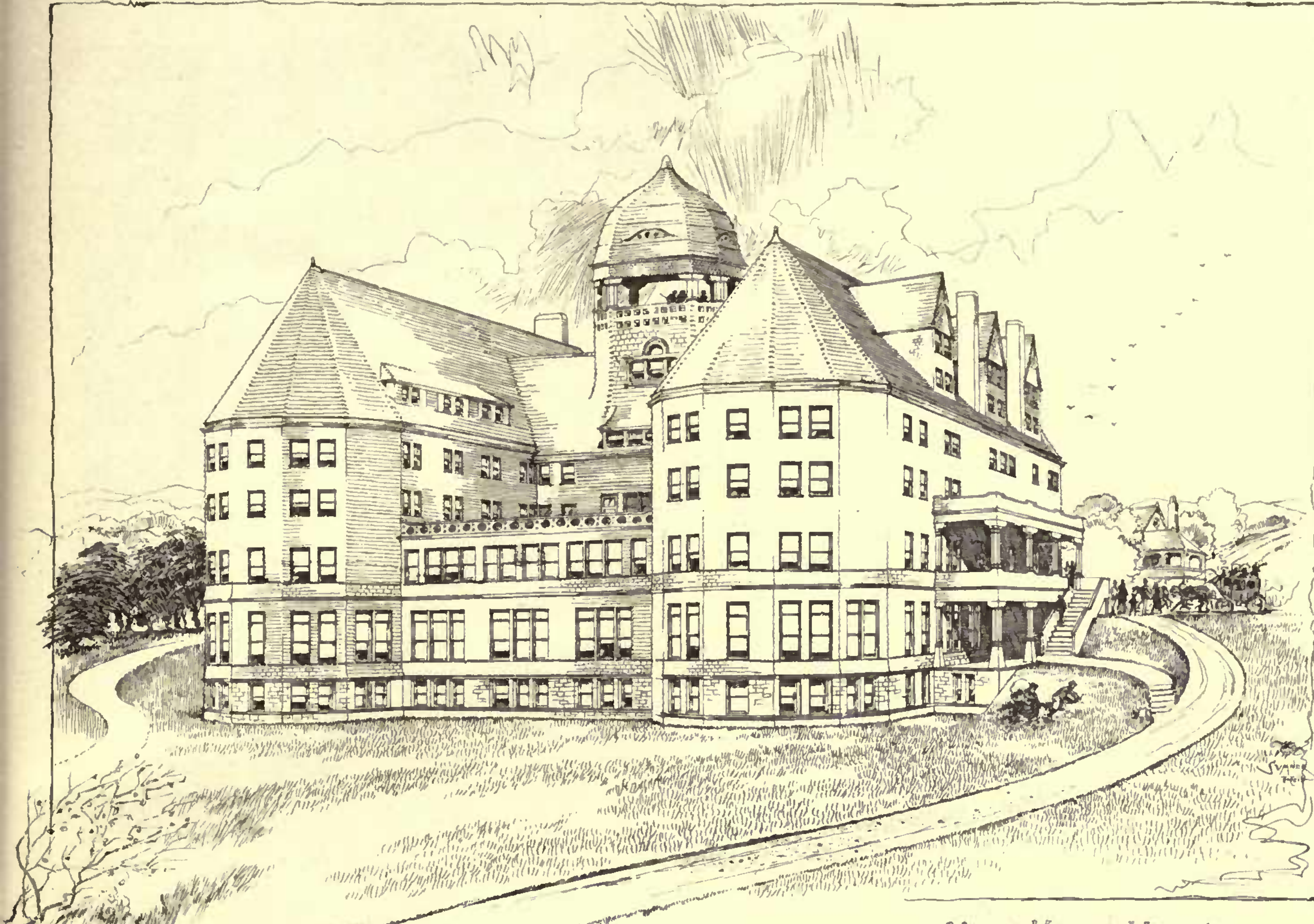
Heliotype Printing Co. Boston

THE RATH-HAUS, BRESLAU, GERMANY.

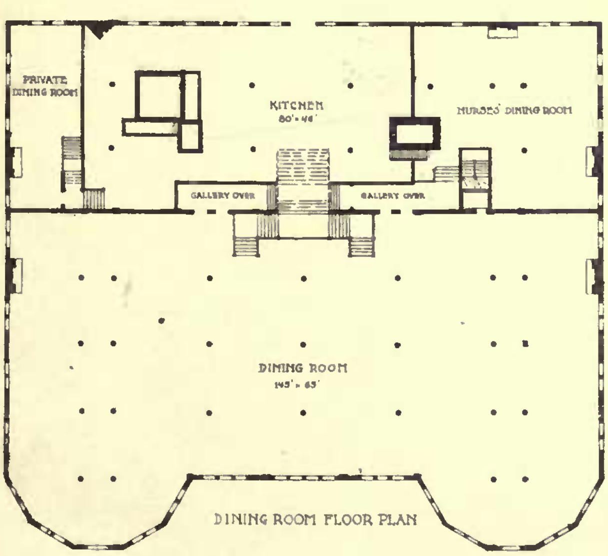
COPYRIGHT 1888 BY TICKNOR & CO

AMERICAN ARCHITECT AND BUILDING NEWS, JUNE 30 1888 No. 653

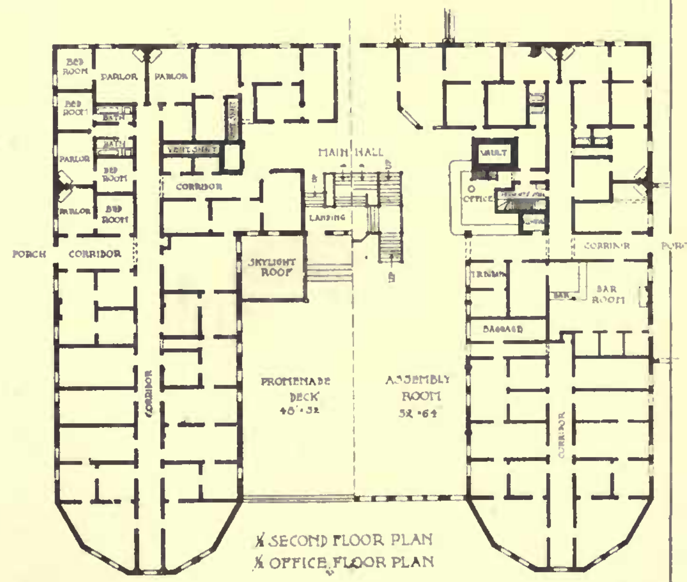
COPYRIGHT 1888 BY TICKNOR & CO



·NEW·KENT·HOUSE·
Chautauqua-Lakewood·N.Y.· E.A.KENT·ARCHT
BUFFALO N.Y.

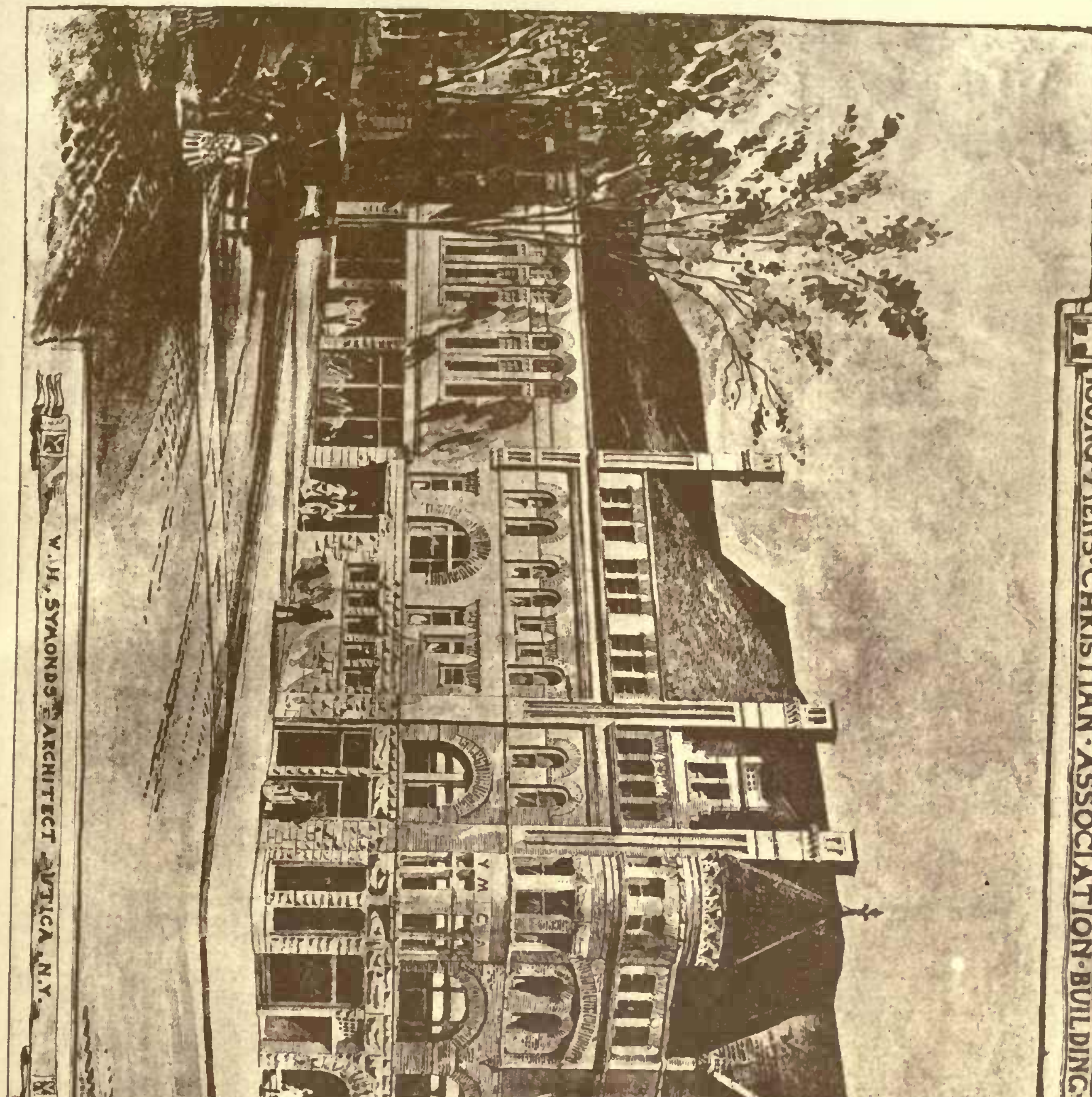


DINING ROOM FLOOR PLAN



½ SECOND FLOOR PLAN
½ OFFICE FLOOR PLAN

Heliotype Printing Co. Boston



Heliotype Printing Co. Boston

(between the wings as shown), facing the north has little sun, and to have trees, shrubs, etc., and a fountain in the centre. The water from latter by a simple gravity pressure operates a fountain in office, dining-room and on front lawn with pumping one lot of water. House is 150′ x 112′; cost about $50,000 by day labor, no contracts, fire-escapes, gas in all rooms, ten bath-rooms, no plumbing in sleeping-rooms, has elevator and Turkish baths. All frame, with hardwood interior in part. Is five miles from Jamestown.

DESIGN FOR A TOWN-HALL. MESSRS. RAND & TAYLOR, ARCHITECTS, BOSTON, MASS.

YOUNG MEN'S CHRISTIAN ASSOCIATION BUILDING, UTICA, N. Y. MR. W. H. SYMONDS, ARCHITECT, UTICA, N. Y.

COMPETITIVE DESIGN FOR HOUSE FOR LITTLE WANDERERS, BOSTON, MASS. DESIGNED BY MR. E. C. FISHER, BOSTON, MASS.

MEDIÆVAL HOUSES.[1] — II.

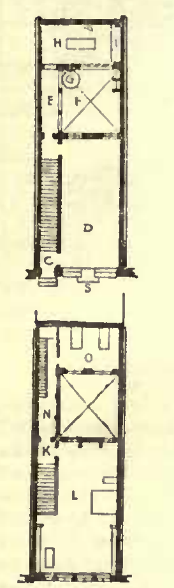


Fig. 4.

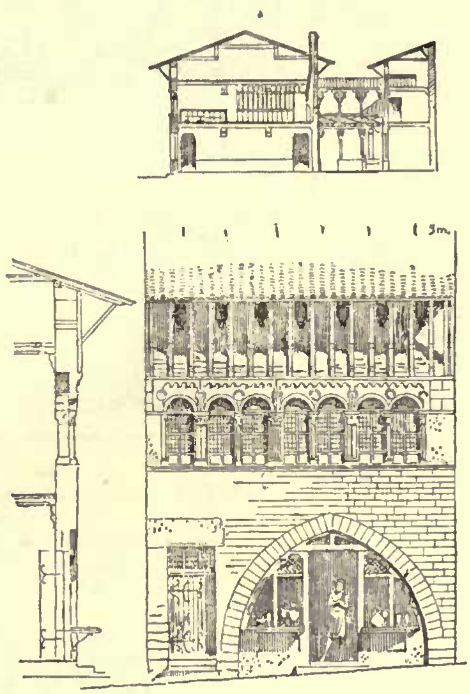


Fig. 5.

THE interior arrangements of the Romanesque dwellings, differed essentially from those of Gallo-Romanic and Merovingian houses. In the latter the separation of the women's apartments was still in vogue, while the common use of rooms was the rule in the houses of the eleventh century. Gregory of Tours mentions the women's rooms: "Septimine can be seen in the domain of Marlheim turning the grindstone to prepare the flour necessary to nourish the women gathered in the women's room." In the Romanesque houses of the twelfth century the family assembled together in the hall. On the ground-floor the largest space was used as a shop, if the proprietor were a merchant, the *salon* being on the first story. This *salon* served as a bed-room and as a gathering-place; it was large and contained the beds of father, mother and children under age. The apprentices, or servants, slept in the garret above the first story. The kitchen of that period was separated from the principal apartment by a small court, and was reached by a covered gallery. A passage-way with a straight stairway, on one side of the store, led directly from the street into the *salon* on the first floor. From this *salon* a gallery led to the floor above the kitchen. Houses in the town of Cluny were built after this plan (Figure 4). The ground-plan *A* shows the straight stair *C*, the store *D*, the gallery *E*, the court *F*, the kitchen *H*, with the large chimney *I* and a well at *G*. The first floor *B* shows the landing of the stairs *K*, the *salon L*, the windowed-gallery *N*, with a little stair to the garret and a chamber *O*. The general section *ab.* is shown in Figure 5 at *A*, and the elevation of the front of the house at *B*. This front is still preserved to the level *C*, the garret-floor only having been destroyed. Of the rear walls but little remains.

The thirteenth-century houses of Cluny had party-walls common to two proprietors, and while this was an ordinary custom in most of the French cities, there are some places, particularly in Burgundy, where the houses of the twelfth and thirteenth centuries are separated by a straight alley and had independent sidewalls. This custom existed generally in most of the *bastides*, or small walled towns, built at the end of the thirteenth century under the reign of Edward I in Guienne.

The rules for the building of houses in French cities during the Middle Ages, their projections over the street, the manner of obtaining light, the supply of water, etc., were infinitely varied, each lord establishing peculiar customs in the territory committed to his jurisdiction.

Occasionally two houses joined by a party-wall and under one roof had two drains to two side-alleys. There can still be seen in the little town of Montreale (Yonne) several houses built on this system, and there is one near the side-gate of Avallon still in very good preservation. Figure 6 gives a plan[2] of this double house, which seems to belong to the first years of the thirteenth century. The street-front of this double house is given in Figure 7. The front piers, with their corbellings, carry a balcony at the level of the first story, and the two roofs, sloping from a common gable, project far enough to shelter the porches, cellar stairs and balconies. The small gardens behind the houses were reached by alleys. It is not clear whether the gardens were common to several houses or belonged only to one, for their walls are long since thrown down. The alleys between single and double houses had, as a matter of course, led to the building of guttered walls on the alleys and gables on the street. In the Gascon tongue they were called *endrannes*, and were found even where there were continuous porches or covered ways on the street, an arrangement quite frequent in the French and English towns of the thirteenth and fourteenth centuries, on the Garonne, the Dordogne, the Lot and in the Southern provinces.

It is obvious that this system suggested joining lots and building two houses under one roof, with the partition-wall in the peak of the gable, a scheme which permitted an increased width for the alleys.

At Montpazier, a city of perfectly regular plan, the alleys are very narrow, and houses fronting upon streets of ten metres in width had alleys three metres wide in the rear.

In the article on "Construction," Figures 115, 116, 117 and 118, are the elevations, plans and sections of another such house in Cluny, built near the middle of the thirteenth century.

Already the windows were larger, the stories higher, the stone-construction of more importance and of greater elegance. In many walled cities of the thirteenth century houses of several stories were built with entire fronts of stone.

On the "place" of the little city of St. Antonin (Tarn et Garonne) where there is a famous town-house, may still be seen a number of thirteenth-century houses of a monumental character, very spacious and deep, and with wide fronts of remarkable construction. The ground-floor is occupied by stores or stalls, the first and second floors having a large *salon* on the street in the front, and a staircase and small room at the back, opening upon the alley as at Montpazier's (Figure 8). The arcades on the ground-floor served as windows, as is still the case in some localities, and curtains were hung in them to separate the merchants from their customers in the street. The large *salons* of the first and second floors were lighted mainly by the succession of arches, in which were four windows separated by narrow piers.

The servants lived, or provisions were kept, in the garret under the roof. The window-jambs of the first and second stories were provided, at the spring of the arch, with iron rings with hooks, intended to hold rods to which were fixed awnings, such as are still used in the South of France, in Italy and in Spain. Figure 9 shows the arrangement of these awnings. At *A* is a hook-ring fixed in the stone. The awnings are separated by rails, the rods fitting into one another (See detail *B*). The rods *C* held out the foot of the hangings which were raised and lowered by cords passing below, in the form of a St. Andrew's Cross, and fastened through the rings to the hooks *D*. A large gathered valance fell over the front, and by its weight served to keep the rods *C* properly inclined.

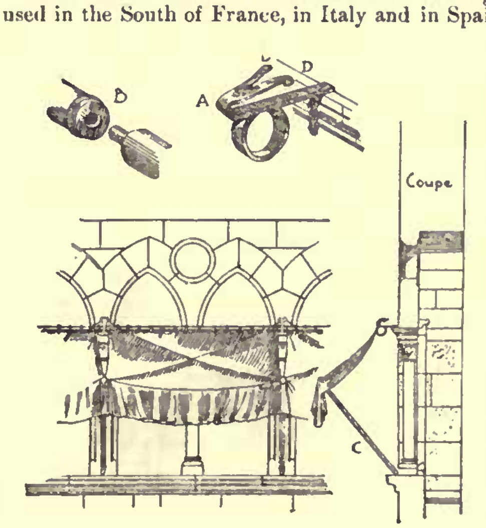


Fig. 9.

In the little city of Cordes, between St. Antonin and Gaillac, many houses dating from the thirteenth and fourteenth centuries have been preserved, and in their architecture and interior arrangements they are very like those we have just described.

The cities of the Garonne, the Tarn, the Lot and the Aveyron were profoundly imbued with the communal spirit, and had never abandoned the municipal traditions of the Gallo-Romanic epoch. Most of them have preserved Mediæval dwellings which indicate the existence of a well-developed local administration, great interior

[1] Translated from the French of Viollet-le-Duc, by Mr. A. B. Bibb. Continued from page 283, No. 651.

[2] [Too late to replace them we discover that the cuts for Figs. 6, 7 and 8 have been mislaid. — EDS.]

prosperity and habits of good living, even of luxury, which have disappeared since the religious wars of the sixteenth century.

It has been said that the houses of the Middle Ages were inferior, gloomy, small, dark and uninhabitable. The old houses of St. Antonin, Cordes, Saint-Yriex, Montpazier, Toulouse, Périgueux, Alby, Mont-Ferrand, Cluny, Provins, Bourges, Laon, Beauvais, Rheims, Soissons, Dol, Caen, Chartres, Dreux, Angers, etc. (nearly all the ancient houses still in existence being found in cities of the second or third order, rich and prosperous, though not great centres of population in the Middle Ages), if compared with modern houses in the same localities, will be found superior to the latter in construction, plan and appearance, and they prove the existence of a more advanced and solidly established social status, a less fugitive prosperity and stronger municipal institutions.

A comparison between one of the houses of the little city of Cordes and a great hôtel of modern Paris would be absurd, but compare an old house of St. Antonin with one of those built to-day in the same locality; compare the hôtel of modern Paris with the hôtel of Sens, of Trémouille, of Saint-Pol, of Cluny or even the house of Jacques Cœur at Bourges, still almost entire, and it is the modern house which suffers in the comparison.

It is a mistake in discussing art, to confound civlization with intellectual development. Society may be perfectly polished and luxurious in habits even to its lowest caste, yet totally without intellectual expansion.

From the twelfth, and during the thirteenth and fourteenth centuries, great edifices were builded and great artists thronged in Paris, Rouen, Lyons, Rheims, Chartres, Bourges, Tours, Toulouse. In the smallest town, in the smallest village of France, we find an art proportionately ennobled. Not so to-day! We build magnificent palaces at Paris, at Lyons or at Marseilles, but what are they doing in the provinces? Poor, tottering constructions, hideous of aspect, while affecting a certain air of luxury, inconvenient houses, hardly habitable, hiding the ignorance of the builder or the absurdities of the proprietor under cover which every winter threatens to demolish, houses having the merit of showing neither art nor good sense. Puerile vanity only is apparent in the symmetrical front and meanly luxurious interiors.

We are astonished to find in a little ancient town like Pompeii cheap brick houses, full, however, of examples of a charming art. In the Middle Ages the same gift of putting art into everything is observable. The houses of Pompeii would not be comfortable for us of the nineteenth century; those of the thirteenth century in France would be hardly more so, but what has that to do with the question of their art? The houses of Pompeii charm us because they are indeed the homes of the people of the Campagna; those of Cluny and Cordes have the same quality, but what would ours be to the people who came to them after six centuries, should any of them last so long? Comfort is the rule to-day, it is said. Let us see how the rule works. Does comfort demand, for instance, that we build houses at Marseilles after the model of those at Paris, and fronts exposed to the north like those which look to the south? Is it comfortable to light all rooms, large or small, by windows of the same size, too narrow for the *salon* and too wide for the closet? Are porches on the street upon which the sun and the rain beat down unchecked particularly comfortable? Is the multiplying of small rooms in a contracted space where one must spend his life opening and shutting doors, and where there is hardly room for the most indispensable articles of furniture conducive to comfort? Are stories less than three metres high healthy and comfortable? Are thin walls, zinc roofs which subject the interior to all the changes of temperature, and the absence of eaves, which leaves the openings exposed all day to the rays of the sun, to be termed comfortable? In the country things are even worse. The little white house with walls of cardboard, roofs of zinc, windows badly set, the ground floor damp, stairs that shake, floors that creak, kitchen distributing nauseous odors through the interior, such a beautiful little square pavillion, so brilliant in the sun, is this comfortable? Is the modern château, with its towers, its ornamented roofs, its veneering of brick and stone, pretending to imitate ancient construction, the home of comfort? Not at all. All this is for show. The towers are hung upon iron, the complicated roof, covered with economy, but glittering from crest to gutter with zinc, lets water into the interior; the thin walls crack and the floors bend under weights too heavy for them. The water-spouts are insufficient; the chimneys smoke because large fireplaces are the thing for a château and the flues must be small enough to pass through the thin walls. There are always large rooms on the ground-floor, while the upper floors are divided by numerous partitions, and sometimes chimneys are carried upon the middle of the floors. But it would be an endless task to enumerate all the miseries, more or less concealed, of the modern "château," miseries which reveal themselves from time to time to the public through legal processes aimed against the obliging architect, who, after all, has only done what was demanded of him and what there would have been ten others to do had he refused.

Mediæval houses were made to suit the habits of those who built them; moreover, they were wisely and simply constructed. Every want was met by a particular arrangement. The door was not made to please the eye of those who passed, but for those who went into the house. The windows were not symmetrically arranged, but they lighted the place they were intended to light and were of a size suitable to that place. The stairs were not concealed. The fronts were sheltered where it was necessary. Carving was rare, but the floors were good and solid, the walls of a substantial thickness. In the Southern provinces the windows were small; in the North they were numerous and large. In the houses of the common people the arrangement seldom varied. There was always the hall on every floor, with an interior staircase, or, more frequently, one at the back, and a small court. The plan would not have suited us we must admit, but it suited the habits of those times when, even in the château, the family, that is to say the relatives and servants, assembled together in one room about the master.

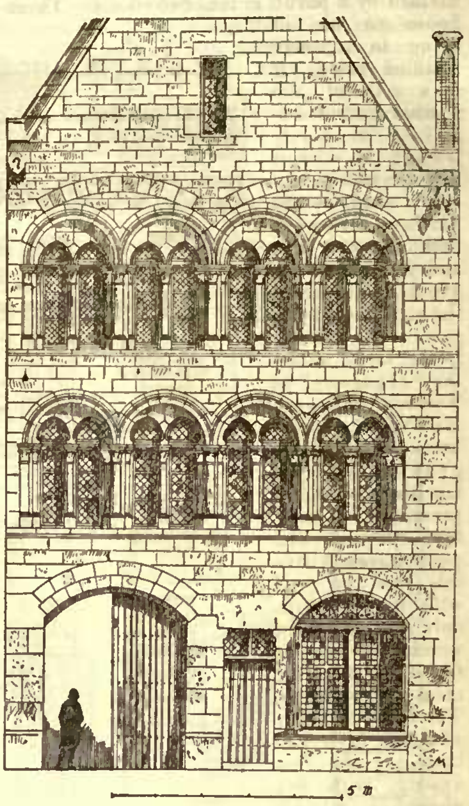


Fig. 9 bis.

At Beauvais, Soissons and Amiens, cities of the commercial and populous North, we find some remains of houses badly shattered, but still sufficiently whole to give a perfect idea of their scheme of construction, which was the same as that of the houses built at Saint Antonin, Cordes and Sarlat between 1230 and 1300, an invariable feature of which was the "*grande salle*" upon the street front of each story. The civil architecture of the Northern cities was, however, of a more monumental character and displayed the spirit of a free people. The beautiful ruins of a house in the Rue Saint-Martin at Amiens, resembling in style the houses of Beauvais, Soissons and Saint-Antonin built between the years 1230 and 1240, may be cited as an example. There is a certain majestic air in this architecture which is wanting in that of the South. In the illustration (Fig. 9 *bis*), we have restored the gable and the ground-floor from other remains of the same period and locality, these parts having been destroyed or modified in the house of the Rue Saint-Martin.

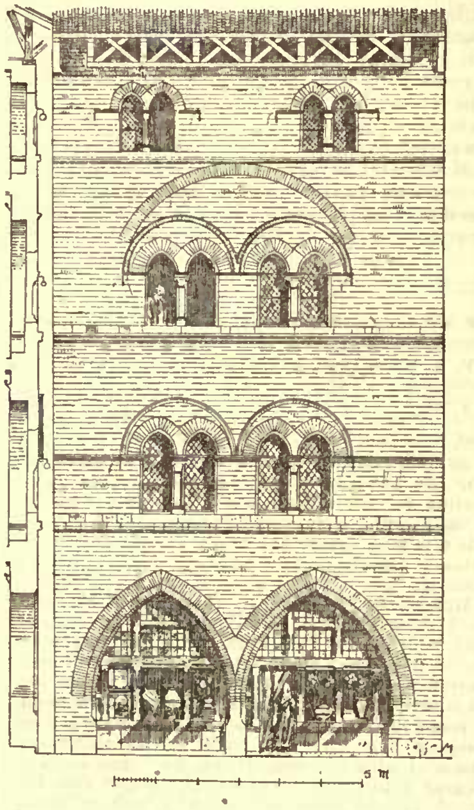


Fig. 10.

The marked difference between the styles is more striking if we make a comparison between the stone houses of the North and those built for the most part of brick in certain Southern cities. Figure 10 is a house at Caussade (Tarn et Garonne) contemporaneous with those of Saint Antonin and Amiens and dating from the middle of the thirteenth century. The bases of the piers of the ground-floor, the small columns of the windows and the band-courses above are of the hard stone of Caylus; the rest is of brick. The stalls in the lower part were repaired and the windows of the first story changed during the fifteenth century, but the plan and shape of the original

windows can still be perfectly seen. Those of the two upper stories have been preserved. In plan, this house has on the first and second floors a large *salon*, almost square, with a chimney, a staircase and a small room with windows opening upon a garden. The third floor is divided by a partition into two rooms. There still lingers about this house an air of being in a small fortified town; it is a relic of the southern municipalities so sorely tried in the wars of the Albigenses.

A more recent northern house, built between 1240 and 1250, or thereabouts, and one of the richest and largest of that time, is the house called the "Musiciens" in Tambour Street, Rheims. This house, of which the ground-floor is much mutilated, has preserved intact its first story on the public street. Above this was the roof with its mansards, only a few traces of which are to be found under the modern covering. The front had four windows, high and large, on the first story, with five niches, in which were placed sitting figures of musicians more than life-size.

Fig. 11.

The first musician, commencing on the left, plays the tambour and a kind of wind-instrument, the second plays the bag-pipe, the third, in the middle, holds a falcon on his clenched hand, the fourth plays the barp, and the fifth the violin; this last statue is crowned with a chaplet of flowers (Fig. 11). Only the small arches and the door-jambs of the ground-floor shops shown in the drawing remain. A large porte-cochère opens, near the opposite end, upon a court formerly surrounded by buildings of the same epoch, of which only fragmentary ruins are left. The broad street front was divided into two *salons* of nearly equal size and the stairway was on the court side. The house probably belonged to a band of minstrels of Rheims who were famous in the thirteenth century, not only in Champagne, but throughout the North. The construction is simple, the ornamentation rich, and the sculpture in the best style.

[To be continued.]

MANCHURIA'S GOLD MINES. — The attention of the Chinese Government having been directed to the gold fields in the Amoor regions by recent disorders there, a commission was appointed to examine and report on the best means of working these deposits. An official who was sent to the spot gives a doleful account of the desolation of the region in question and the difficulty of procuring food. The country, he says, is covered with snow in winter to the depth of ten to twelve feet, "and in summer and autumn there is a species of insect which fills up people's noses, making life unbearable." There are no roads, and to supply military protection for the miners would be a serious matter. Notwithstanding this unfavorable report the Foreign Board at Pekin has strongly urged that mining operations under the control of the Government be undertaken without delay. Li Hung Chang, who was also consulted in the matter, has drawn up a series of sixteen suggestions for working the Manchurian gold mines. He proposes the establishment of a joint-stock company, and is willing himself to advance by way of loan a considerable part of the capital; the earliest operations should take place on the ground from which the Russian, Chinese and Corean "gold marauders" were expelled by Chinese troops two years ago, and foreign mining engineers should be engaged to superintend the work. Two steamboats are being built to carry supplies up the Amoor to the mines and four others to cruise on the rivers and keep order. The question of labor is a difficult one, for "men contemplate going to this region with dread"; but it is thought that the Chinese who were hunted out two years ago, and who took refuge in Russian territory, might be willing to come back and resume work, and should be invited to do so. The troops should be employed in clearing a road from Tsitsihar across the mountains, and arrangements must be made to increase the garrisons in this part of Manchuria. These proposals appear to have been accepted, and accordingly the mines will now be worked with the aid and under the control of the Chinese Government, though nominally by a joint-stock company. — *The London Times.*

MR. PETRIE'S FINDS IN THE FAYUM.

HAVING begun work with the first day of the year and carried it on through the almost intolerable heat of the fiercest Egyptian spring known for at least the last decade, Mr. W. M. Flinders Petrie has at length brought his arduous Fayûm campaign to a close. The last report on Mr. Petrie's explorations left him at Beyahmu, where he had succeeded in identifying not only the shattered remains of the two colossi described by Herodotus, (chapter 149, Book II,) but also the twin pedestals upon which they stood and the sloping inclosure walls by which each statue was surrounded, thus solving the problem of their apparent, but impossible, position on the tops of a pair of pyramids. From Beyahmu Mr. Petrie moved on to Hawara, about four miles distant in a southeast direction, and it is from this point that we again take up the thread of his adventures.

At Hawara there is a dilapidated brick pyramid which enjoys the reputation of never having been opened, and an extensive area of level ground thickly honeycombed with the foundations of brick buildings. These foundations and this pyramid were conjecturally identified by Lepsius nearly fifty years ago with the remains of the Labyrinth and the tomb of the founder. The meanness of the ruins and the poverty of the material have, however, caused his identification to be received, at all events, of late years, with considerable mistrust, and it was with a view to settling this interesting question that Mr. Petrie migrated to Hawara on the 24th of last January with a following of fifty-three men and boys, and pitched his tent in the shadow of the pyramid. As far as the Labyrinth was concerned, a first glance at the ruins in the plain was enough. His practical knowledge of epochs of building in the Nile Valley, and of the date of bricks as determined by their dimensions and quality, showed him at once that these foundations represented an extensive village of the period of Roman rule in Egypt. He hesitated, nevertheless, before entirely rejecting Lepsius's hypothesis. The general aspect of the site corresponded fairly well with the descriptions of the Labyrinth in Herodotus and Strabo; and this, at all events, could be said of no other place in the Fayûm. Strabo says: "We have here in the Labyrinth a work equal to the pyramids, and adjoining it the tomb of the King who constructed the Labyrinth. After proceeding beyond the first entrance of the canal about thirty or forty stadia there is a table-shaped plain with a village and a large palace composed of as many palaces as there were formerly nomes. . . . At the end of this building, which occupies more than a stadium, is the tomb, which is a quadrangular pyramid, each side of which is about four plethra in length and of equal height." (Chapter 1, section 37, Book XVII.) So also Herodotus, at the end of his famous description of this marvellous building, which, in his opinion, surpassed all the greatest works of the Greeks, expressly says: "At the corner of the Labyrinth stands a pyramid forty fathoms high with large figures engraved on it, which is entered by a subterranean passage." (Chapter 148, Book II.)

Here, then, was the table land, and here, on the verge of the table-land, was the pyramid. Stripped of the stone casing with which it must have been covered when Herodotus saw it engraved with "large figures," it still answered, without more discrepancy than might be allowed for surface loss, to the measurement given by Strabo. That is to say, the four plethra of the Greek geographer equal 400 feet, and the present dimensions of the square of the pyramid are about 348 feet each way. So Mr. Petrie decided to lay siege to the place by opening the pyramid, and excavating below the Roman remains in the "table-land." The results of this last test were extremely interesting. The Roman houses proved to have been built upon a foundation composed of a mass of the finest white limestone chips, clearly the débris of some vast building. Digging through this débris, Mr. Petrie everywhere discovered, below the chips, a most carefully-prepared foundation — such a foundation as was never dreamed of in Ramesside times — consisting in some places of a kind of concrete made of rammed stone chips, and in other places of clean, levelled sand. He then tracked out to the edges of the site, and ascertained that the building must have covered an immense area of some forty or fifty acres in extent. Fragments of the original pavement were also found here and there *in situ*. Having sounded these depths of ruin — sounded, and dredged, and brought up nothing, not the merest scrap of inscription

or moulding — he came to the conclusion that not even the most thorough sifting of the whole "table-land" was likely to produce anything more. As for the stone chambers discovered by Lepsius, and by him identified as part of the Labyrinth, Mr. Petrie testifies that they were constructed in a pit dug through the great bed of the concrete, and are therefore undoubtedly subsequent to the original building. They also closely resemble some tombs of Roman epoch which are found in the same neighborhood. To sum up, Lepsius was correct as to the site, but wrong as to the ruins, and it is now clear that, after having served for many centuries as a quarry for the architects of Medinet-el-Fayûm, the most renowned building of all antiquity has so utterly perished that only its foundation remains to preserve the measure of its greatness.

The opening of the pyramid (the traditional sepulchre of Amenembat III, the "Moeris" of the Greek writers) was a longer and a far more arduous undertaking than the exploration of the Labyrinth, of which that Pharaoh was the builder. The stone casing, as before mentioned, is entirely gone, and all that now remains is a crumbling structure of sun-dried bricks, to which Lepsius half a century ago, and Vassali some twenty-five years later, did much damage without discovering the entrance. A vast number of bricks have been knocked away on the north and east faces, while on the south side the pyramid presents the appearance of a mere mound of ruin. Unpromising as it looked Mr. Petrie decided to attack it scientifically, not wrecking the mass like his predecessors, but tunneling patiently to the centre from the north face. His method is best shown by the following extract from one of his private journals written a few days after the work was begun: "The pyramid tunnel goes on at the rate of five feet per diem. The bricks are all laid with beds of loose sand, which runs out freely at a touch, and I was much afraid that it would continue to dribble out of the joints and let down all the bricks around the tunnel; but it holds up very well with my roof boarding. The man who works it is so confident of its security that he lives in the tunnel day and night, being the warmest and most sheltered lodging he can find. Three times a day I go in and put up two roof boards, one under the middle of a line of bricks, and another under a joint. I tried putting the boards under the joints only, but then a brick drops out before I can board up the end of it at the next joint. We get three bricks' length, (about five feet), with joints, done daily. The whole tunnel is six feet high and two and one-half feet wide."

Creeping forward in this wise, foot by foot, the roof and sides constantly threatening to cave in, and the dust-laden air becoming hourly more and more irritating to eyes, throat and lungs, the miner probed his way till the centre was so nearly reached that Mr. Petrie hourly expected to strike the walls of the sepulchral chamber. Then came the first of a series of disappointments. He discovered that his tunnel was skirting a dense brick wall, built without sand joints, and entirely different from the mass through which he had hitherto been working. This wall descended at a rapid slope into the native rock, which had evidently been excavated to receive the core of the building. Following it, Mr. Petrie presently found that it went below the base of the outer structure, and then turned due west, at right angles to the former direction; he accordingly turned the course of his tunnel, and, still hugging the wall, reached a large brick arch, which he at once recognized as the vaulting above the stone roof of the chamber. The work had now become so exciting that he put on relays of men for both night and day tunneling, and offered rewards to the one who should first reach the stone masonry and the one who should first get into the chamber. The former prize was won that same night. At 1.30 in the morning a couple of boys who helped in the night work came running to the tent, crying, "El hagar telat! El odeh gai!" ("The stone appears! the room is come!") This stone proved to be one of the roofing blocks of the chamber which, as Mr. Petrie had expected, was constructed like the chamber in the recently-opened pyramid of Pepi Merira at Sakkarah, with a pent roof made of enormous stone beams tilted against each other at an angle of forty-five degrees. Now, the roof of Pepi's chamber, which consists of three layers of stone beams, is fifteen feet thick, and as it seemed improbable that the Pharaoh of the Labyrinth should have erected for himself a tomb less massive than that of Pepi, Mr. Petrie, who had no proper quarrying tools and no skilled quarrymen, naturally hesitated before the difficulties of so heavy a task. The next day's work showed these difficulties to be even greater than he had anticipated. The stone wall supporting the roof was found to be ten feet in thickness, the roof itself being strengthened by a bank of enormous stone beams stacked on edge. To get through such a mass was all but impossible, and to sink a shaft through a roof fifteen feet thick was almost as bad. Yet this last was the only way, and, nothing daunted, Mr. Petrie resolved to attempt it.

The heat by this time had become tremendous. It was close upon the end of April, and in less than three weeks the great Mohammedan fast of Ramadan would be at hand, when no man works and all things are at a standstill. Yet, with skilled labor, if skilled labor could be had, the thing might surely be done. So our explorer started off to Medinet-el-Fayûm, and engaged the services of certain masons, who undertook to pierce the roof for him at the rate of five shillings per cubic metre. As they were accustomed to making rock-cut wells and cisterns, and reported of themselves as doing on the average one metre a day, Mr. Petrie now constantly hoped to get into the chamber in less than a week. But alas for the vanity of human expectations, especially in Egypt! Two days went by and no masons came. At last, on the third day, a couple of workmen made their appearance, expecting to meet their master on the spot. The master mason, however, never came at all, and, after hanging aimlessly about the place for some twenty-four hours, the workmen went their way. Meanwhile three or four of his own men and boys had been down with sunstroke, and Mr. Petrie, seeing the utter hopelessness of the position found himself reluctantly compelled to defer the boring of the roof till next season. The disappointment, of course, is great; but it is a mere disappointment of delay, and not of failure. Much is already achieved. The tunnel is made; the sepulchral chamber is found; and within a fortnight after Mr. Petrie's return to Hawara next season we may expect to receive full particulars of the opening of the tomb of an Egyptian Pharaoh — an event unparalleled in the records of modern explorations. Nor is this all. The Pyramid of Hawara, like the Pyramids of Ghizeh and Sakkarah, had a funerary chapel adjoining, and among the ruins of this chapel Mr. Petrie has found fragments of several hieroglyphic inscriptions, containing the cartouches of Amenemhat III. There can therefore be no reasonable doubt that this pyramid is the tomb of that famous King, or that his mummy yet reposes in its inviolate sepulchre.

While the pyramid tunnel was in progress Mr. Petrie was actively engaged in the exploration of a vast cemetery, hitherto unknown and untouched, which he discovered in the immediate neighborhood. It proved to be entirely of the Greek and Græco-Roman period, and must have been the necropolis of the town built over the site of the Labyrinth. The graves reach to no great depth below the surface — that is to say, it does not consist of successive strata of tombs like the great burial fields of Sakkarah, Abydos and Thebes — but it extends over a surface of something like one hundred acres. The superficial character of the intermines made it, however, very easy to work, and Mr. Petrie has consequently been able to exhaust the richest quarters in a single season. He has exhumed many hundreds of mummies, and found an extraordinary number of interesting objects buried with the dead, as funerary vases in alabaster, terra-cotta and glass; toilet ornaments, tools, toys, coins (chiefly Roman;) amulets, mirrors, beads, moulds, a casket with panels of carved ivory, hundreds of fragmentary papyri, consisting mainly of lists and accounts; a great store of funerary wrappings of beautiful embroidered and woven textiles, such as have lately been found in the Roman and Coptic quarters of the great cemetery at Ekhmeem, and, most interesting of all, a splendid fragment of the Second Book of the Iliad, written on papyrus in the finest Greek hand, before the rounded uncial or cursive scripts came into use. This precious document was found rolled up under the head of a mummy which was buried simply in the sand, without the protection of a tomb. Mr. Petrie has not yet ventured to unroll it, but it measures apparently from three-and-one-half feet to four feet in length. The depth of the papyrus sheet is eleven inches, with twenty-two lines of horizontal writing between two wide margins at top and bottom. The date of the manuscript is about the second or third century. It will be edited by Professor Sayce.

The mummies found in the cemetery are, as usual, of all classes, some parts being crowded with poor interments and others reserved for the tombs of the rich. These last are for the most part of a style elsewhere known, being inclosed in elaborately-gilded cartonnages, inlaid upon the stuccoed surface with imitation jewelry incrusted with cut-jaspers, cornelians, onyxes and other precious stones. But by far the most valuable possessions which these good Egyptians of Roman time carried with them to their graves were their portraits — portraits painted on panel, the pigments being laid on with a wax medium, and in many instances as fresh as the day when they left the easel of the artist. Of these Mr. Petrie has found no less than sixty — men and women, youths and maidens, and children of both sexes; some admirably free and bold in treatment, some delicately and even minutely finished, others stiff and hard, thus showing the work of various hands, and testifying to the existence of a local school of art in this remote provincial town of Upper Egypt which can have been little, if at all, inferior to the contemporaneous schools of Rome and Pompeii. Twelve of the finest of these portraits have been claimed by M. Grébaut for the Boulak Museum; but among the forty-eight which Mr. Petrie brings to England are some very beautiful specimens. The best of these, together with a large number of the richest gilded mummies and many hundreds of interesting antiquities from the Hawara Cemetery, will, it is understood, be exhibited in London during the present season. — *London Times.*

BOOKS AND PAPERS.

TWO English architects, Messrs. Graham & Ashbee, have made a pleasant book of travels,[1] composed in agreeable proportions of general description of country, people and manners, on the one hand, and of architectural observations and research on the other. No specialty perhaps is so excellent a stimulant to the interest of

[1] "*Travels in Tunisia,*" with a map, a glossary, a bibliography and fifty illustrations. By Alexander Graham, F. R. I. B. A., and N. S. Ashbee, F. S. A., F. R. G. S. London, 1887.

foreign travel as that of architecture; and where the man of general education and culture passing through a region but ill-provided with the conveniences and comforts which the modern tourist requires, finds the balance between pleasure and the price paid for it to incline slightly in the wrong direction, the architect's enjoyment is reinforced by an artistic interest which rises easily superior to all the discomforts and privations of the way.

From an immemorial antiquity, the southern shores of the Mediterranean Sea have shared, not the darkness and barbarism of the great Continent to which they belong geographically, but the most advanced civilization of the governing races of the earth. As the star of empire has taken its westward way, these shores have lain full in its track. Of the Phœnician civilization we know but little, but that little is enough to show us the traces of a power which was able to defy for centuries the conquering pride of Rome. Its time came at last, and Carthage disappeared from the face of the earth so completely that even the imagination and enthusiasm of the archæologists have been unable to reconstruct its splendors. The Romans entered into possession, and over the whole of this vast region for eight hundred years the pulse of Roman life beat strong and full. Great cities arose with their solid and enduring monuments — temples, aqueducts, roads, — a teeming population covered the fertile plains with farms and villas, and cultivated the arts of peace and war. Then came in their turn the Arabian hordes, sweeping westward with the banner of the Prophet, bringing, first desolation, and then, a new civilization on the ruins of the old — a civilization in which the most delicate and fragile forms of art, and the habits of the most luxurious, most enervating indolence were set alongside a fanaticism and warlike energy capable of going all lengths in the direction of ferocity and barbarism. The wave of Mahommedanism passed on and reached on the hills of Granada and in the valley of the Guadalquivir its breaking point. For seven hundred years the Moorish power maintained itself in Spain, and recruited itself from the great storehouse of Northern Africa. But the Moorish civilization was out of touch with that of Europe, and when it was expelled from Spain, it lost its last hope of taking a place among the permanent and progressive civilizations of the modern world. The shores of Northern Africa received back the exiles of Cordova and Granada, but the tide was ebbing fast. The later history of the Moors has been the history of a relapse into barbarism and obscurity, and the regions which they conquered and colonized with unprecedented rapidity have lain broad open to the first comer who cared to make a serious effort to possess himself of them.

The first comer turned out to be France, a nation never much given to colonial enterprise, but which has, during the last fifty years, set herself resolutely to the work of rehabilitating this much worn-out country, building her fringes of Parisian streets and stately terraces along the sea-front of the old Moorish towns, driving her long lines of railway along the coast and far into the interior, and establishing her comprehensive system of provincial and municipal administration all over the country. England has been the great colonizer, but it would be difficult to find any English colony which has, in the first half century of its existence, taken on so much of the aspect and character of an English community as Algeria has acquired of the aspect and character of a French community.

The Frenchman has his fine estate well under his eye, and from the great port of Marseilles the cities of the African coast, Oran, Algiers, Bone, Tunis and the rest, are reached by daily steamers more easily and quickly than many portions of France itself.

That a region occupying such a central position on the map of Europe (for to all intents and purposes these countries are not African but European) with a history so well filled with romance and connected with the history of the foremost peoples of all the ages, should be so almost wholly an unknown land to the hordes of European and American travellers who every winter overrun the northern, eastern and western shores of the Mediterranean — who look westward from the cities of Sicily, or eastward from the cities of Spain, oblivious of the vast region almost within their vision, appears at first thought incomprehensible. Especially when one remembers that Algiers has become during these last years, by virtue of its climate, a winter resort scarcely less crowded and fashionable than the towns of the Riviera, does it seem singular that in Constantine and Tunis an English or American face is as rare as in the Sandwich Islands.

Yet if one is asked what are the attractions which should induce the stream of pleasure travel to turn itself into the abandoned ways of the Barbary States, he will not improbably find himself somewhat at loss for a satisfactory reply. The general aspect of the country is, it must be confessed, not alluring. Scorched by the southern sun and by the hot breath of the desert, shut off from the sea by the long chain of the Atlas Mountains, it stretches itself out in vast arid plains, treeless, houseless, vacant of every living thing, save where one comes upon an encampment of wandering Arabs with their white tents, their grazing camels, their majestic white-robed figures, with swarthy faces and fierce eyes glowing under the shadow of the hood. The blessed steam-train takes you over these desolate wastes none too quickly. There are, of course, exceptions. One may make most interesting excursions northward into the valleys of the Atlas, or to their seaward slopes where the Kabyles dwell, or he may travel southward to the edge of the great desert, and luxuriate among the palms and the fountains of Biskra or of Gabes. But these are episodes which involve certain privations, not to say hardships, to which the modern tourist is little disposed to subject himself.

The interest centres in the towns, of which Algiers, Constantine and Tunis may be confidently said to surpass in pictorial effect any of the cities of Europe, an effect altogether apart from any architectural picturesqueness, but due to the fact that the traveller is here brought face to face with the people, the dress, the customs of the East, unchanged by time or by contact with the conquering Franks. In the narrow streets, in the bazaars, in the cafés, in the mosques (for in Algiers, though not, we believe, elsewhere, a Christian even is suffered to enter the sacred gates), the pictures and the scenes one witnesses are the pictures and the scenes of Oriental life, and full of the color, the movement, the strange remoteness of the East. Not in Cairo or Damascus does one see more characteristic types or feel himself more steeped in the atmosphere of the "Arabian Nights" than in Tangier, Algiers or Tunis. But if the traveller looks beyond this pictorial aspect and seeks for any splendor of monumental art, any imposing remains of the old greatness, either of Moorish or of Roman dominion, he is doomed to disappointment. When one reflects how little is left, even in Spain, of the art of the Moors, how little, even in Italy, of the art of the Romans, one will think it less surprising that in Africa, where the life of the people has, since the Arabian conquest, been for the most part nomadic, so nearly nothing remains of the fragile structures of the Moors or of the more enduring monuments of Rome.

Of the latter, however, there is left one striking example, which, in spite of neglect and abuse, remains to this day in a tolerable state of preservation. This is the great amphitheatre at El Djem, some hundred miles south of Tunis, near the sea. El Djem is the ancient Thysdrus, a city of which little or nothing seems to be accurately known. But the size and magnificence of this theatre is striking evidence of the importance of the community for which such a structure was thought fitting. All other traces of the Roman city have disappeared — temples, basilicas, baths, aqueducts — nothing is left but this majestic amphitheatre, which, as at Rome, Arles, Verona, Nismes, has stood while all around it crumbled and sank beneath the soil. In size this monument approaches more nearly the dimensions of its great prototype, the Colosseum of Rome, than any other of the provincial amphitheatres except Verona, which it very nearly equalled, its major axis being 489 feet, its minor axis 403, while in design it followed the Colosseum more closely than any other rival, having three stories of open arcades, surmounted by a solid attic broken by pilasters. The attic is gone, if, indeed, it was ever finished; a great breach equal to one-quarter the perimeter of the building was opened two hundred years ago by Turkish artillery. "The ranges of seats in the interior have long since disappeared and the arena is choked with earth and a confused mass of stone and rubble."

It is remarkable that the French occupation of these regions has now lasted for upwards of fifty years, and that so little, so nearly nothing in fact, has yet been done in the way of intelligent and scientific exploration of the sites of Roman cities. It must not be supposed that the architecture of which such scanty remains now exist above ground, was, on account of its provincial situation, inferior in character to that of the capital. The drawings and measurements of Bruce indicate that the details and proportions of the orders were practically the same as at Rome and Messrs. Graham and Ashbee confirm his authority. In their account of the Temple of Dongga, they remark that "for elegance of design this portico will compare favorably with any of the better-known examples of Rome or elsewhere." But the interest of the French in the antiquities of their new province has not yet been awakened, and whatever may be said of the abuse of the ancient monuments by the Arabs, it must be acknowledged that the French have shown them quite as little reverence, while they have proved more active in destroying what remained of the ancient buildings whenever their materials could profitably be made use of in new structures.

No really important work of Arabian architecture can be said to exist in Northern Africa. Messrs. Graham and Ashbee have amply described the best that can be found in Tunis, in Kaironan, in Susa, but beside the exquisite remains at Seville and Granada they are insignificant indeed. The most notable among them, as it is also the most ancient, is, doubtless, the mosque of Sidi Okbar at Kaironan. It was built as we are told, about one hundred and fifty years after the Hegira, or late in the eighth century. It is in plan and general design, much like the greater mosque at Cordova, which, however, is much more recent. An open quadrangle is surrounded by an arcade on three sides, the fourth being occupied by the prayer-chamber or interior mosque, with seventeen aisles, separated by marble shafts of various colors, to the number of five hundred or more, "with capitals and bases mostly of white marble, the spoil of the chief buildings of Roman Carthage and other towns in North Africa. . . . Above the shafts rise horse-shoe arches, and these carry a flat trabeated ceiling enriched with gold and color."

The account of Keronan, the sacred city, until lately quite inaccessible to all but true Moslems, is very interesting. So is the account of the remains of the Roman city of Sufetula, consisting mainly of "a range of three temples, placed side by side and partly attached," and surrounded by an enclosing wall. It is encouraging, in view of the French neglect of the antiquities under their control, to be told that "the Société des Monumens Historiques is keeping a watchful eye over these remarkable ruins, and that several inscribed

stones throwing much light on the history of Sufetula have recently been unearthed." C. A. C.

COMMUNICATIONS

SHOULD ARCHITECTS GUARANTEE THE COST OF BUILDINGS?

Ottawa, Ill., June 23, 1888.

To the Editors of the American Architect: —

Dear Sirs. — A few weeks since I was invited to compete (by special request) in a competition for a court-house in California, the amount set being $75,000. My design received the indorsement of the commission, but the Board of Supervisors refused to appropriate more than $50,000, and I have been again requested to present plans, but am informed in the notice, that the statutes of California require a bond of $5,000 that the building can be constructed within the estimate presented. Now I have no objection to executing such a bond, but it occurs to me, that if such is the statute, it is a very ridiculous one, for in no case could an architect foresee the nature of the estimates of the ordinary builder of the country, as the following would show: I have just contracted a building upon which the bids ran from $16,000 to $25,000 and in my opinion the former bid was exactly what the structure was worth, and the contractor will make a far better job of it than the higher bidder, again, I have no record that in any competition that has taken place anywhere where a committee has acted on it, that the accepted plan was just right, or in other words, was not changed after acceptance on the order of the committee; in such a case the bond would be void. What is your ideas of such a requirement.

Respectfully, Wm. A. Youmans, Architect.

[We agree with our correspondent that there is something absurd in compelling an architect to guarantee that a building can be erected for a given sum, a matter which often depends mainly upon local and transitory circumstances, such as labor agitations, corners in materials in that particular market, and last, but not least, the hopefulness, or inexperience, or state of exhilaration, of the contractors who make tenders. At the same time, as it is very common and proper to guard the expenditure of public money by requiring security from all those who may be in a position to waste it, we see no serious objection to the furnishing of such a bond by the architect, while the fact that he has furnished it gives him a control over the work which may be often of great use to him in checking the unauthorized interference of official persons with his duties. The most important point to be made is, we think, that the architect ought to be suitably paid for assuming this additional burden. By giving a bond, he takes upon himself a risk of loss from strikes, labor troubles, bankruptcies, unexpected fluctuations in the price of materials, and so on, which ordinarily falls on the owner, while if fortune should bring lower instead of higher prices, the profit falls to the contractors, not to him. If he were allowed to recompense himself for his risk by keeping all that he could save out of the allotted sum, he would still be no better off than brokers or merchants who guarantee prices; but this would be considered very objectionable in the case of an architect, and the proper alternative is, where bonds are required, to pay him for his guarantee by a suitable percentage on the intended cost of the building. What this percentage should be, we should hardly wish to say definitely, but it could hardly be fairly less than ten per cent on the intended cost. — Editors American Architect.]

PAYING PREMIUM FOR A PARTNERSHIP.

June 21, 1888.

To the Editors of the American Architect: —

Dear Sirs. — I should be very much obliged if you will tell me what is the custom as regards payment of a premium, by an architect about to join another in partnership. A case in point is as follows: A wishes to join with B who appears to have established a fairly good business, B demands $2,000 premium and gives a guaranty of $1,000 for three years, the $2,000 premium to be paid to B and A to have no share in it except in the event of dissolution of partnership by B who then returns a portion of it. Partnership to run for three years. The business turns out to be worth next to nothing. For two years B makes up the guaranteed sum and in the following year gives the required six months' notice and returns about four months' proportion of the $2,000 for the six months. A has for two years really been drawing out his $2,000 again and all that he has made of the business is about eight months' allowance of the last or third year of the partnership. Can this be considered fair and just? A signed the agreement believing B to know more about the matter than he (A) did and supposed it was all right. He has his doubts now. Yours truly, Experience.

[This is a matter about which it would be impossible to give an opinion without knowing all the circumstances. We never knew a premium to be given for entering such a partnership before. In most cases two architects who join forces either bring about equal amounts of business to the common fund, or one of them exchanges his salary as draughtsman for what is estimated to be nearly an equivalent income, to be derived from a share in the business. If B intentionally made false representations to A in regard to the value of the business, in order to get his two thousand dollars, he might perhaps be made to pay damages, but nothing is more uncertain than an architect's income, and a series of bad years may have come just after a long period of prosperity. — Editors American Architect.]

The Rate of Filtration. — A limit to the rapidity of filtration has been generally adopted by the London water companies; it is represented by the passage of about 540 gallons of water through each square yard of the upper surface area of the filter in twenty-four hours, or two and a half gallons through each square yard of surface per hour. Water passed through well-constructed filter-beds at a rate not exceeding this becomes under ordinary conditions bright and clear. — *Exchange.*

Ancient Bath Discovered. — Prof. Lanciani reports a most interesting find at Ostia, where the work has been resumed since his return from America. A bath has been opened which seems to have been struck by some disaster, apparently an earthquake, while in full use, and to have been so completely buried as never to have been visited again. The statues found are broken as if by the fall on them of the masonry from above, being split vertically, and the fragments being found at some distances from the bases. Lanciani hopes for most interesting results from this excavation when complete.

The Effect of Manganese on Steel. — Among the inventive processes shown in the Glasgow Exhibition is one by a Sheffield firm, which demonstrates that steel, when mixed with manganese to the extent of 24 per cent, becomes almost non-susceptible to the influence of a magnet. As the non-susceptibility goes on increasing proportionally to the percentage of manganese, it is just possible that the proportion of 26 or 27 per cent leaves the steel wholly non-magnetic in the sense that the poles of a magnet would fail to take up any fine particles. For watch-making and nautical purposes this will be a very valuable contribution to the discoveries of the day. — *Court Journal.*

TRADE SURVEYS

Builders, small manufacturers, and small business men throughout the interior of the country have been encouraged within the past few months to believe that the operation of the Inter-State Commerce Law is having and will continue to have a favorable effect upon their interests It is too soon to express an opinion on a matter concerning which there is, as yet, so little statistical material from which to draw conclusions. It seems reasonable, however, to suppose that the Long and Short Haul Clause will do good to small places and small industries It was apparent for years prior to the enactment of that law that the railroads favored commercial and manufacturing centres and competitive points at the expense of non-competitive points. This evil grew to very large dimensions, but the general public did not fully comprehend its extent at that time. Now that it has been removed, the beneficial effects of uniformity in rates is being felt. This has given rise to a decentralization of industries, which will probably continue. Taxes are lower in small towns than in cities; wages are lower, living is cheaper and more comfortable. and there are many other advantages, to enjoy which many manufacturers are being attracted from the larger cities. Within the past twelve months, scores of large enterprises have been removed from larger cities to small towns and comparatively country places. The effect of this will be felt for a long time to come; it has helped and will continue to help the building interests. Building operations are multiplied where none were before known. Houses are now projected at obscure points in numbers of from ten to two hundred in a lot, which, but for the advantages which uniform freight rates secure, would not be thought of. It may be said that the same amount of building would have been done in the larger cities, but this is scarcely true, and even were as much business done, it is quite probable that the labor employed would have been compelled to put up with crowded and inconvenient quarters near at hand. Reference is made to this point to show that what some builders and manufacturers have recently said concerning the expansion of building activity throughout the country is true and has a solid basis. The lumber manufacturers of the Northwest have recently spoken of this tendency, and credited it with a large share of the improved demand for lumber. A little reference to the lumber trade at this time will be of special interest. It has been supposed by a great many that lumber is accumulating in quantity and declining in price. Statistics show this to be an error. Taking the Chicago market as a sample, the stocks from January 1st to June 20th are given at 566,052,000 feet as against 545,635,000 feet for the same period in 1887, showing an increase of over 20,000,000 feet. Stocks of shingles show a decrease, while the supply of hard wood remains about the same. In other words, the extraordinary demand for lumber throughout the sparsely-settled sections of the country, for general building requirements, has kept stocks low, and, in fact, has absorbed an enormous supply of lumber, which at the opening of the year seemed to threaten a gorge in the market. This is not a mere local condition, but extends throughout the country. The enormous supply of yellow pine from the Gulf and South Atlantic States has been promptly marketed at good prices. All Northern markets, from Boston to the Lakes, and as far south as Baltimore, are liberally supplied at this time, but there is no large accumulation, and the distribution of stocks from week to week throughout the interior is very encouraging to wholesale as well as retail dealers. Extraordinary preparations are being made in the interior for increased supplies of hard woods; architects are liberal in their recommendations of these woods and builders are keeping almost a lock-step with them in this respect. The Southern hard-wood interests are organizing. Within the past few months six or seven conventions have been held for the purpose of regulating production, inspection, prices and general trade interests. The effect of this will be that the production of both Northern and Southern lumber will be kept within the market requirements, which, for the next few years will undoubtedly increase in a regular and steady way. The car-building demand has slightly fallen off; house-building demand is steady; railroad consumption is light; manufacturing requirements are not as urgent as a year ago. Still, taking it all in all, the lumber trade of the country is in a healthier condition than ever before in this respect. It is now so managed that its interests are under a sort of centralized control, not for the purpose of advancing prices, but of maintaining harmony. Other branches of industry are creeping along on their hands and knees, so to speak, feeling their way, and avoiding anything like over-production. The tendency of prices is still downward. It is impossible to select an industry wherein it can be said that there is an upward tendency in prices, excepting it be in two or three branches of the textile trade. The demand for machinery of nearly all kinds is exceptionally active. The industrial condition, in a general way, is healthy. In former periods, over-production would have resulted before this. The fact that the channels of trade are not over-supplied is due to the organizations, which, in some cases, have taken the forms of trusts and in others of syndicates. These out-croppings of combinations are, on the whole, beneficial and could not, even were the managers so disposed, compass the injury of the general public. Legislation is poking its nose into many forms of combinations, with a view of protecting the public interests; it is perhaps a little too soon to assert it, but it is safe to make the assertion that the real interests of the general public will not be damaged by trusts, syndicates or combinations of any kind.

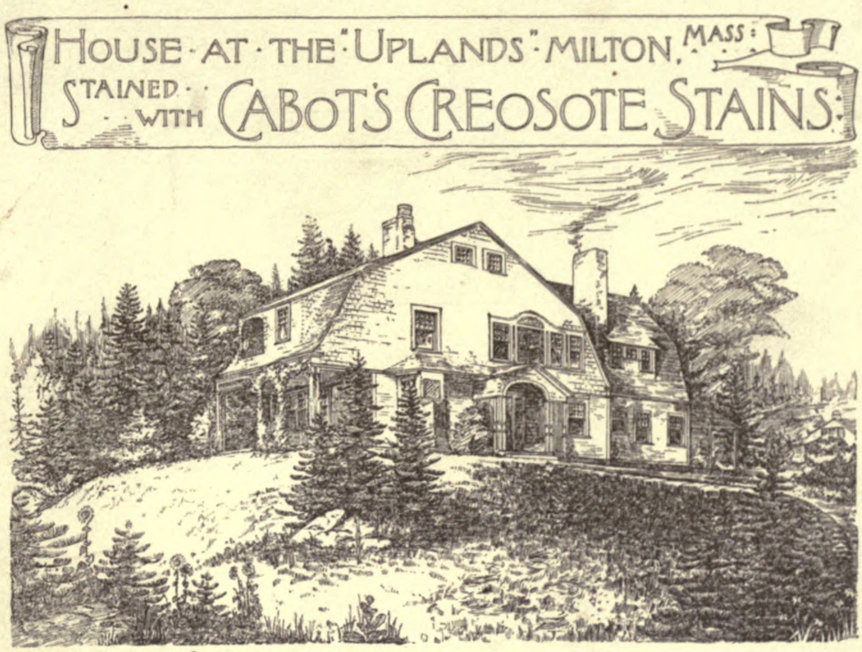
S. J. Parkhill & Co., Printers, Boston.

Copyright, 1888, by TICKNOR & Co.

HELIOTYPE PRINTING CO. BOSTON.

HOUSE OF NATHANIEL THAYER, ESQ., FAIRFIELD STREET, BOSTON, MASS.

STURGIS & BRIGHAM, Architects.



ROTCH · & · TILDEN · ARCHITECTS · BOSTON · · ·

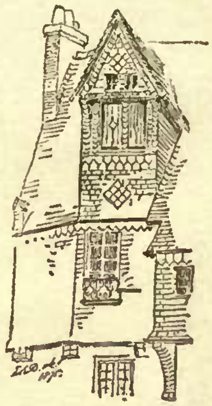
THE exterior of this house is stained with Cabot's Creosote Stain, for Shingles, Fences. Clapboards, Etc. These Stains are very durable and give a much more artistic effect than paint, while they are *cheaper*, and very easy to apply.

Prices are 30, 50, and 75 cents per gallon, according to color.

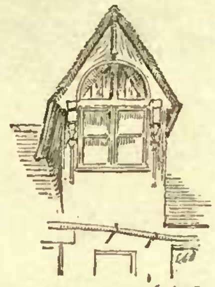
Send for Samples on Wood, and Circulars.

SAMUEL CABOT,

70 Kilby St., Boston, Mass.

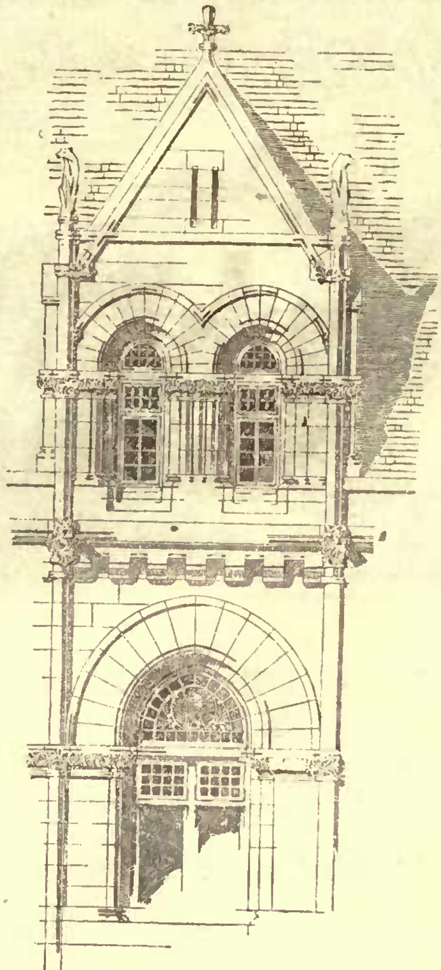


Slate covered Dormer Hanvec, France.

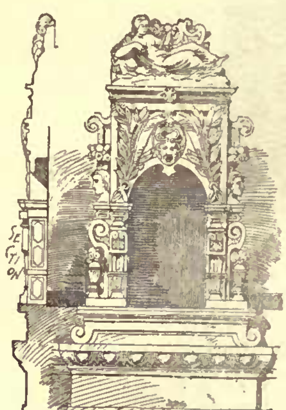


Old Dormer Window Caen, France

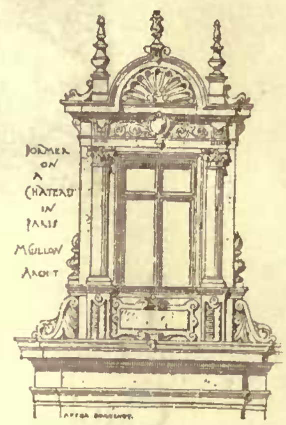
Dormer Window Children's Hospital, Finsbury London Engl^d. J. Sedding: Architect.



Design for Proposed CARNEGIE LIBRARY. Allegheny Pa. W. S. Fraser Arch't Pittsburgh Pa.

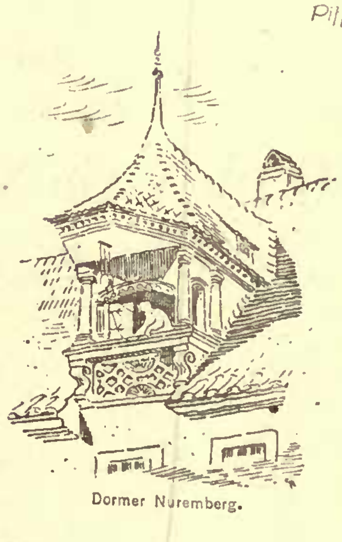


A DORMER FROM CHATEAU DE COURCELLES CALVADOS.

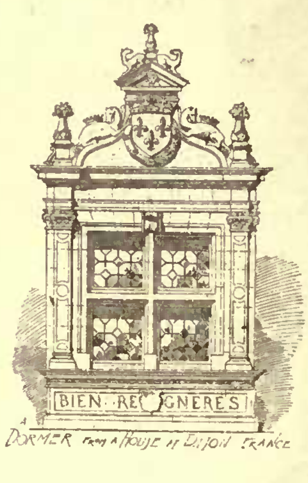


DORMER ON A CHATEAU IN PARIS M'GILLON ARCH'T

Orange N J H. H. Holley

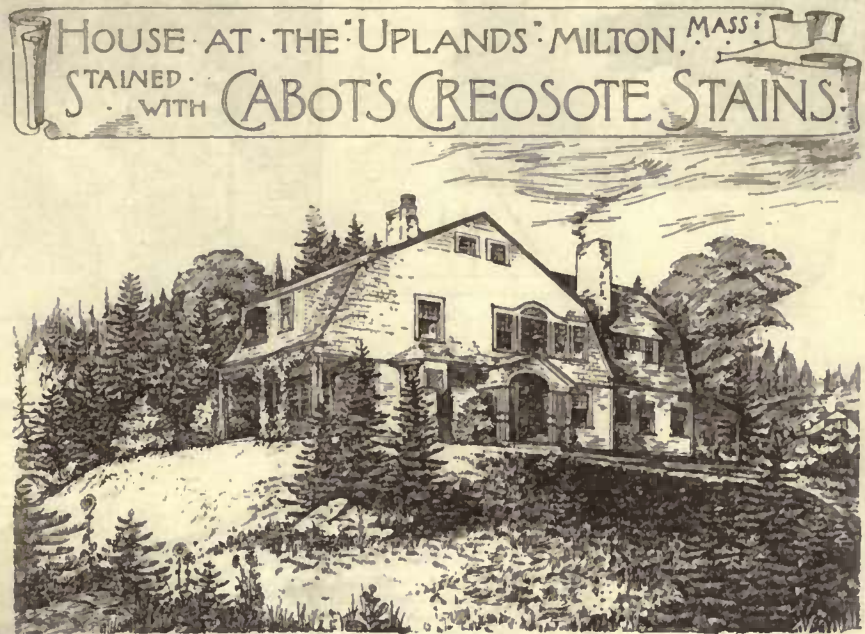


Dormer Nuremberg.



A DORMER FROM A HOUSE AT DIJON FRANCE

DORMERS.



ROTCH · & · TILDEN · ARCHITECTS · BOSTON · · ·

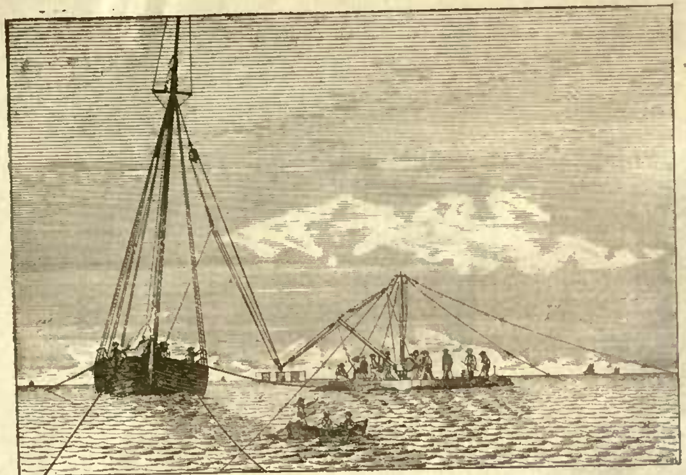
THE exterior of this house is stained with Cabot's Creosote Stain, for Shingles, Fences. Clapboards, Etc. These Stains are very durable and give a much more artistic effect than paint, while they are *cheaper*, and very easy to apply.

Prices are 30, 50, and 75 cents per gallon, according to color.

Send for Samples on Wood, and Circulars.

SAMUEL CABOT,

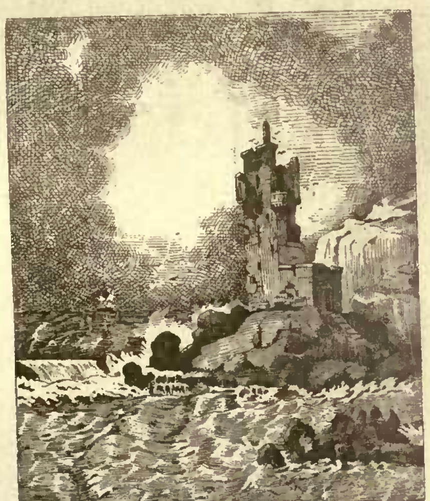
70 Kilby St., Boston, Mass.



Minot's Ledge, Massachusetts Bay.

Maplin Sand, England.

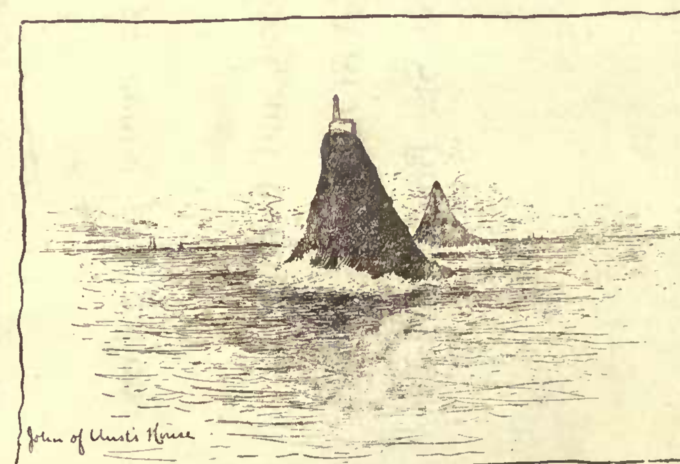
Minot's Ledge, Massachusetts Bay.



THE WATCH-TOWER OF KOAT-VEN

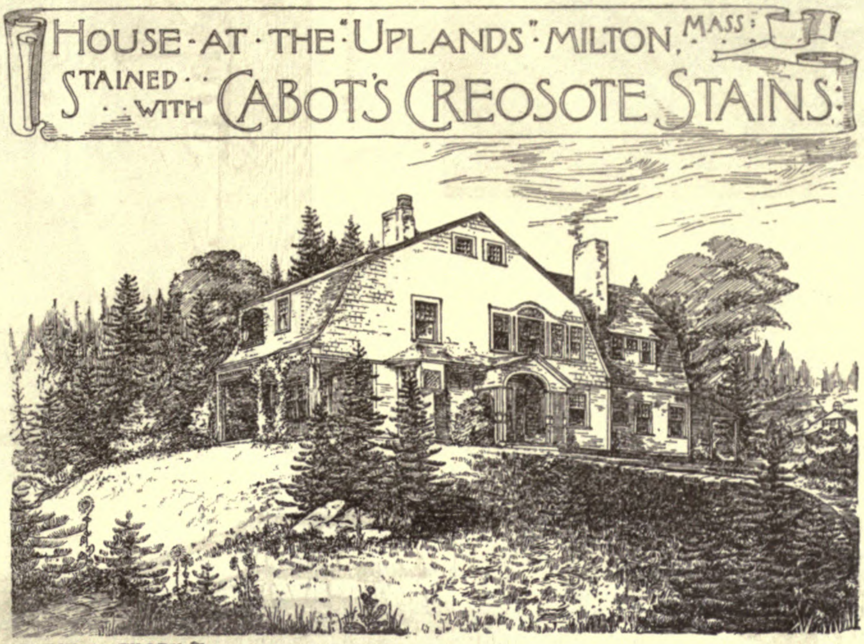
REVUE DES ARTS DECORATIFS

Tillamook Rock, Oregon.



John of Unst's House, near the Shatland Islands

ANCIENT AND MODERN LIGHT-HOUSES.



ROTCH · & · TILDEN · ARCHITECTS · BOSTON · · ·

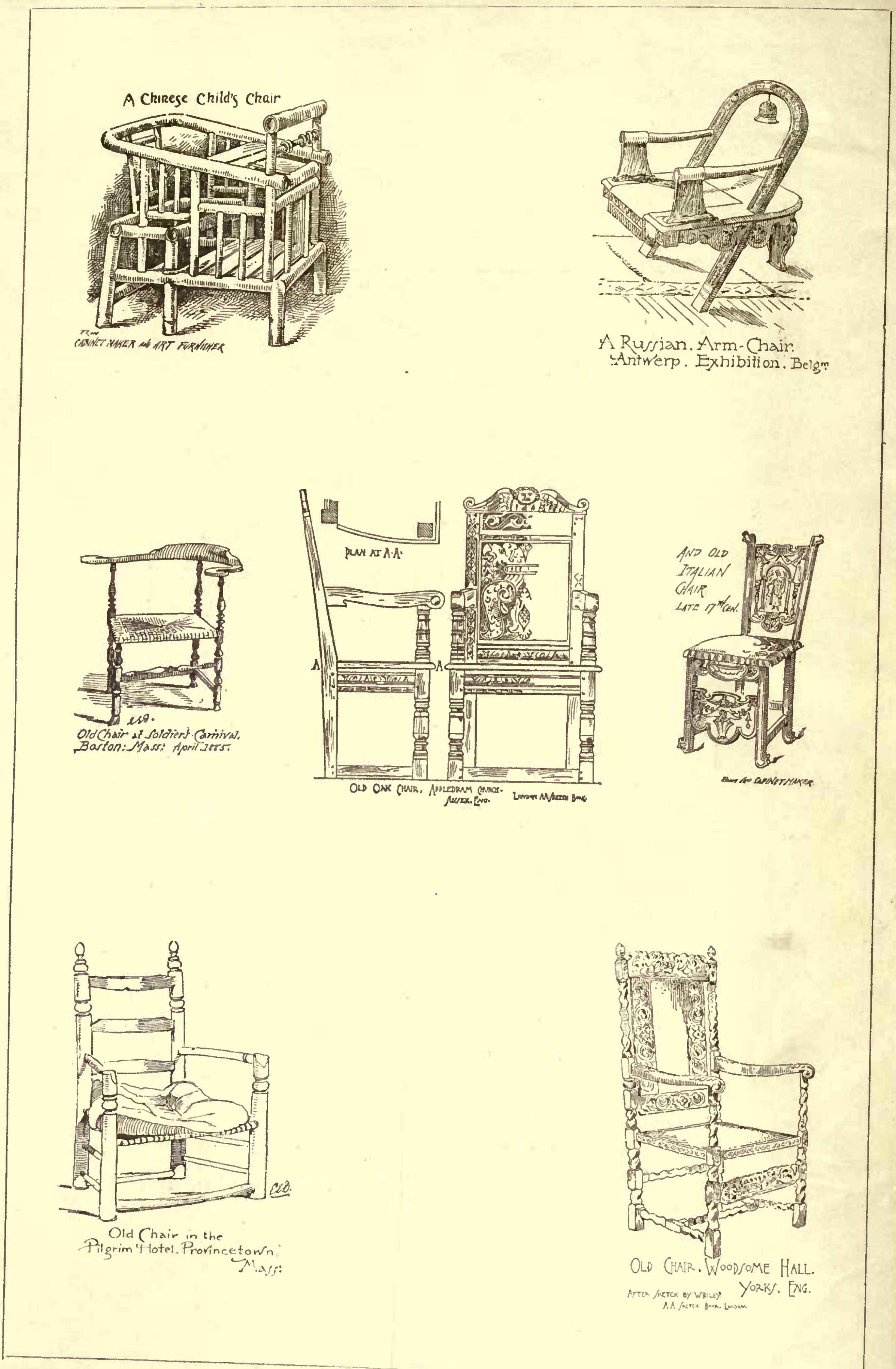
THE exterior of this house is stained with Cabot's Creosote Stain, for Shingles, Fences. Clapboards, Etc. These Stains are very durable and give a much more artistic effect than paint, while they are *cheaper*, and very easy to apply.

Prices are 30, 50, and 75 cents per gallon, according to color.

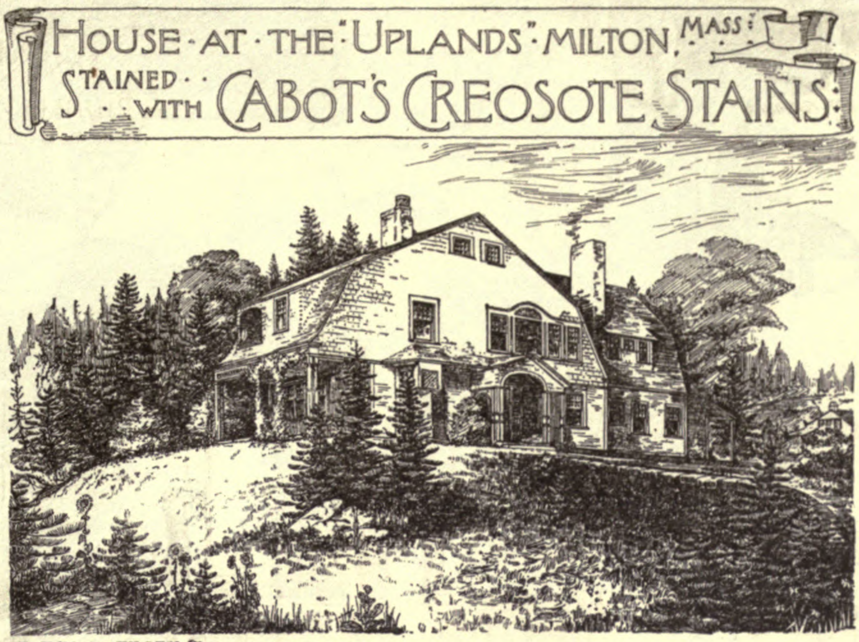
Send for Samples on Wood, and Circulars.

SAMUEL CABOT,

70 Kilby St., Boston, Mass.


A Chinese Child's Chair
From CABINET MAKER and ART FURNISHER
A Russian. Arm-Chair.
Antwerp. Exhibition. Belgm
Old Chair at Soldiers' Carnival.
Boston: Mass: April 1885.
PLAN AT A·A·
A
A
OLD OAK CHAIR, APPLEDRAM CHURCH. SUSSEX. ENG.
AND OLD ITALIAN CHAIR LATE 17th CEN.
Old Chair in the Pilgrim 'Hotel. Provincetown' Mass:
OLD CHAIR. WOODSOME HALL. YORKS. ENG.
AFTER SKETCH BY WRILEY
A.A. SKETCH BOOK, LONDON.

CHAIRS.



ROTCH · & · TILDEN · ARCHITECTS · BOSTON · · ·

THE exterior of this house is stained with Cabot's Creosote Stain, for Shingles, Fences. Clapboards, Etc. These Stains are very durable and give a much more artistic effect than paint, while they are *cheaper*, and very easy to apply.

Prices are 30, 50, and 75 cents per gallon, according to color.

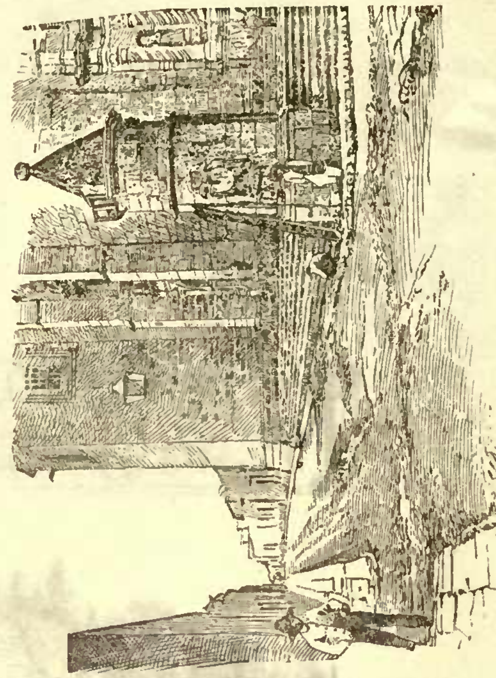
Send for Samples on Wood, and Circulars.

SAMUEL CABOT,

70 Kilby St., Boston, Mass.

MEXICAN SKETCHES.

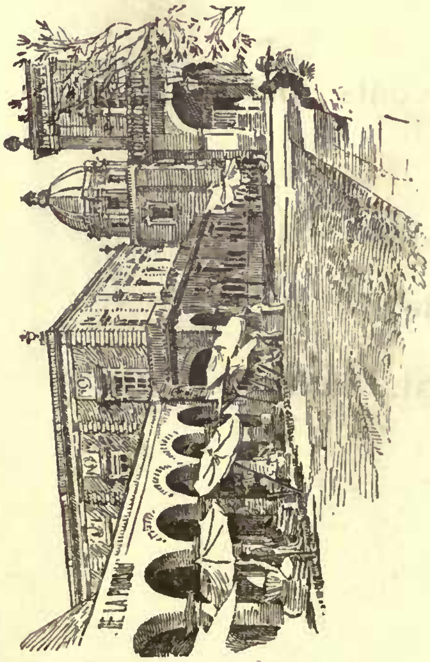
Domes at Guadalupe.



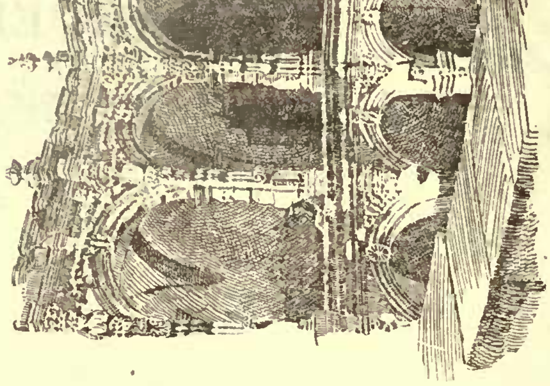
Water Tower and Church of San Augustine, Queretaro.

Street in Adobe Town.

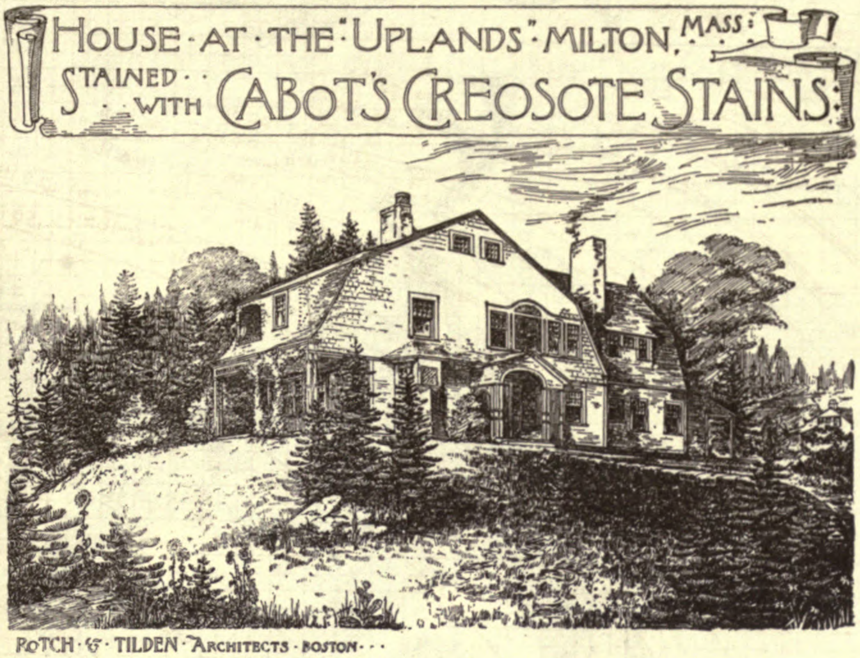
Santa Eulalia, Pasa del Norte, Mexico.



A Corner of the Plaza, Celaya.



Court of Ruined Convent of San Augustine, Queretaro.



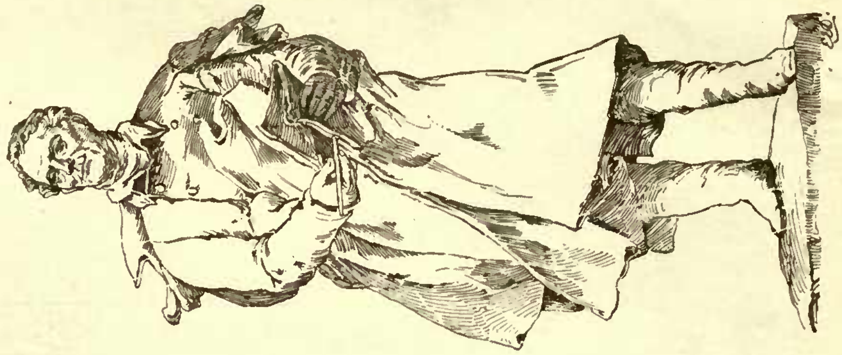
THE exterior of this house is stained with Cabot's Creosote Stain, for Shingles, Fences. Clapboards, Etc. These Stains are very durable and give a much more artistic effect than paint, while they are *cheaper*, and very easy to apply.

Prices are 30, 50, and 75 cents per gallon, according to color.

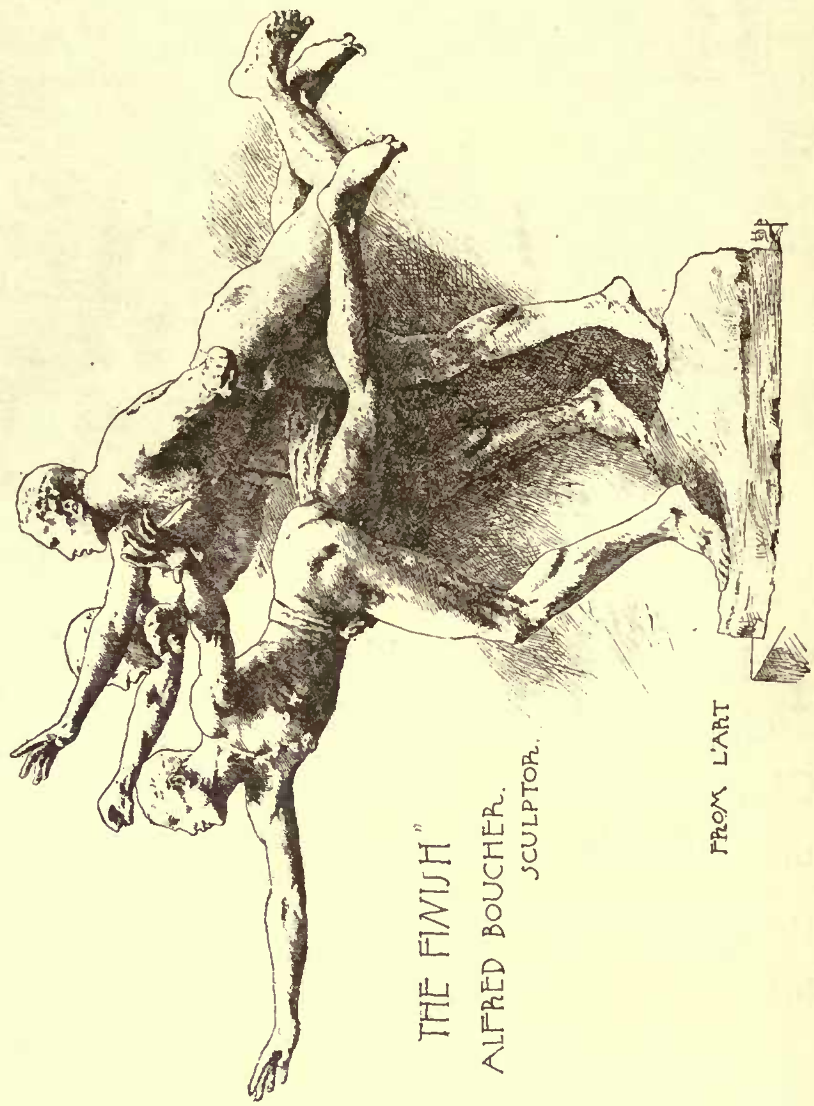
Send for Samples on Wood, and Circulars.

SAMUEL CABOT,

70 Kilby St., Boston, Mass.

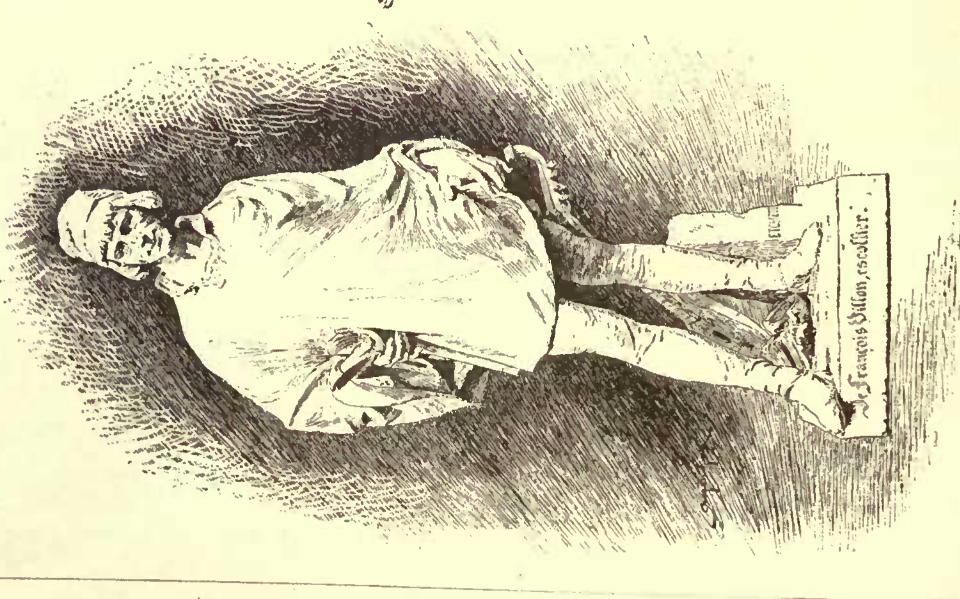


Statue of Lamartine, Macon, France.
Falguiare, Sculptor.

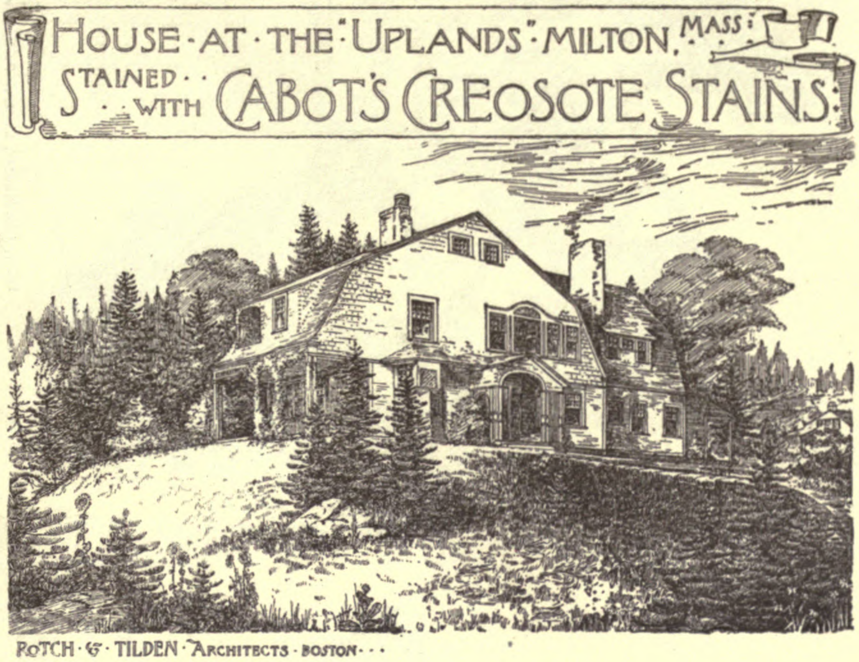


"THE FINISH"
ALFRED BOUCHER.
SCULPTOR.

FROM L'ART



From L'Art.



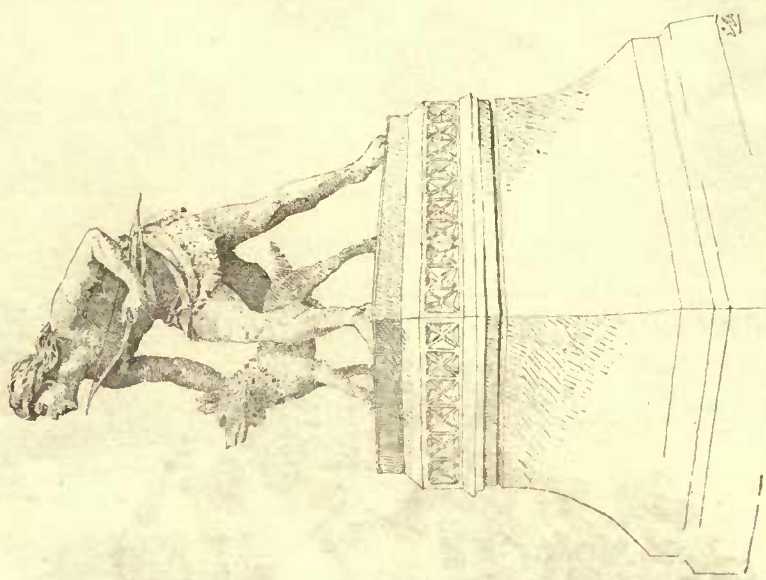
THE exterior of this house is stained with Cabot's Creosote Stain, for Shingles, Fences. Clapboards, Etc. These Stains are very durable and give a much more artistic effect than paint, while they are *cheaper*, and very easy to apply.

Prices are 30, 50, and 75 cents per gallon, according to color.

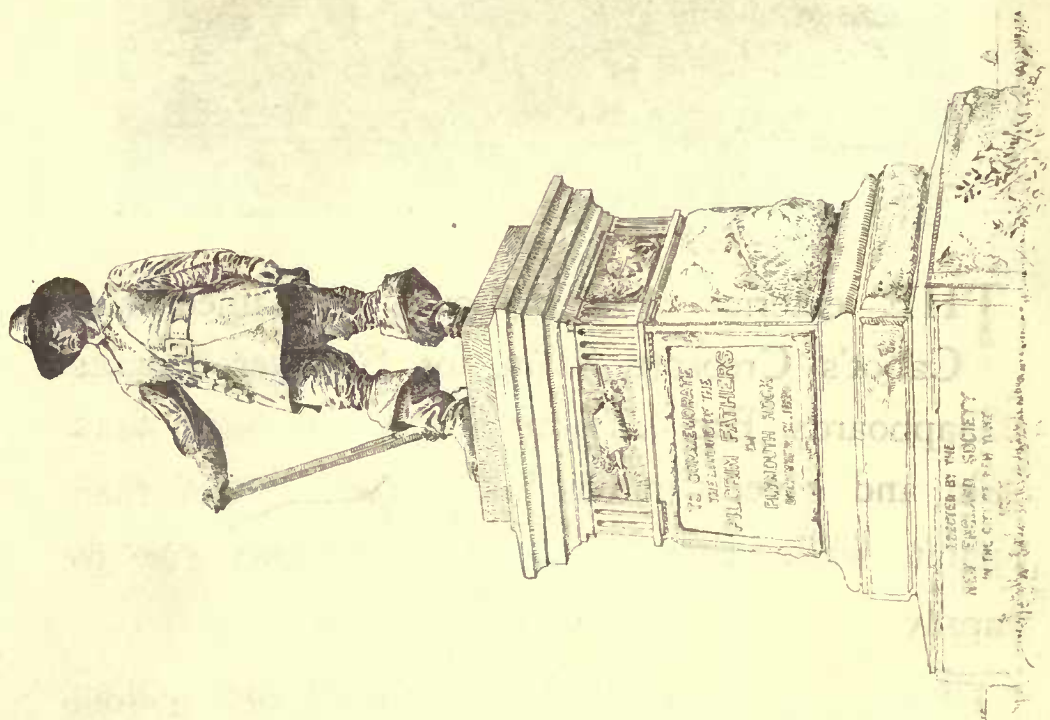
Send for Samples on Wood, and Circulars.

SAMUEL CABOT,

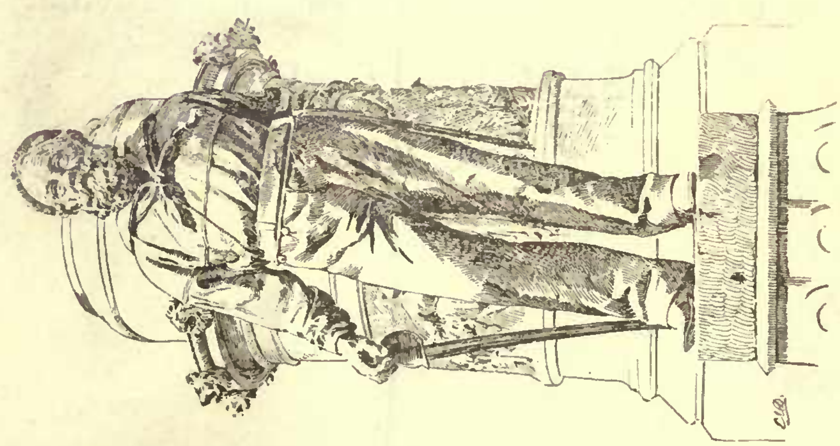
70 Kilby St., Boston, Mass.



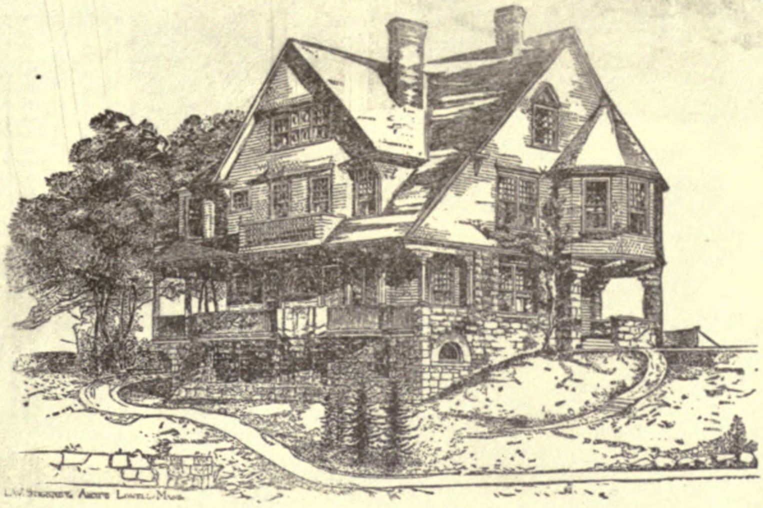
The Indian Hunter, Central Park, New York. J. Q. A. Ward, Sculptor.



The Pilgrim, Central Park, New York. J. Q. A. Ward, Sculptor.



Statue of a Sailor.



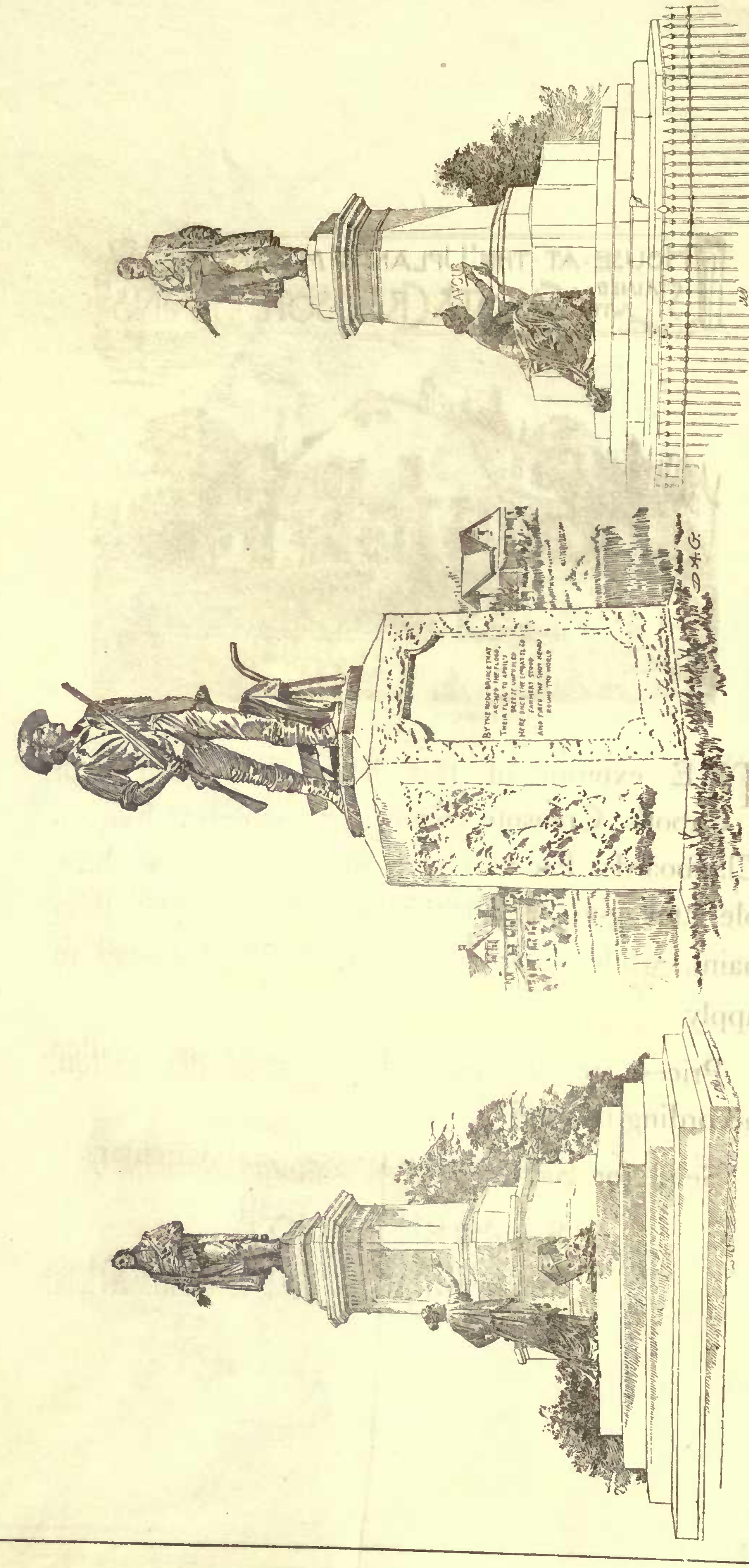
THE exterior of this house is stained with Cabot's Creosote Stain, for Shingles, Fences. Clapboards, Etc. These Stains are very durable and give a much more artistic effect than paint, while they are *cheaper*, and very easy to apply.

Prices are 30, 50, and 75 cents per gallon, according to color.

Send for Samples on Wood, and Circulars.

SAMUEL CABOT,

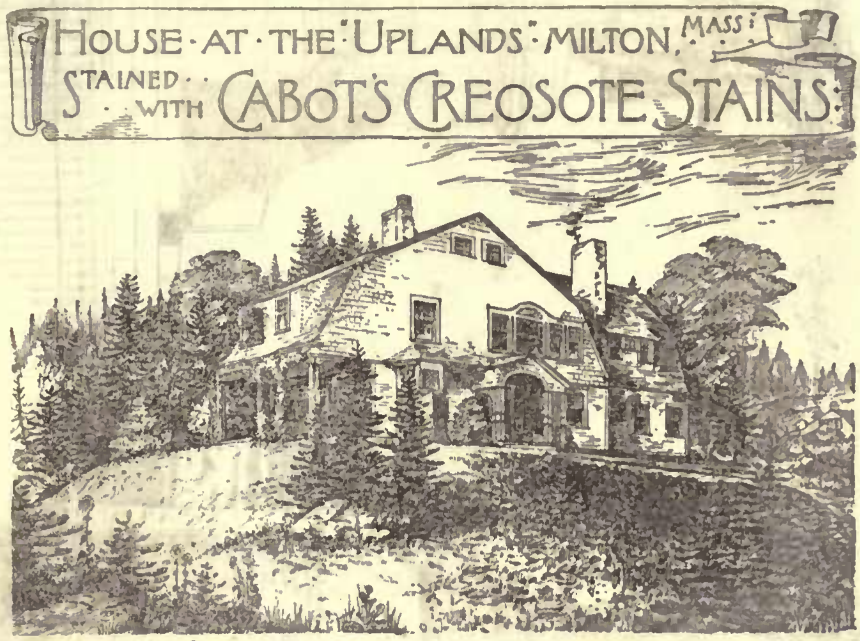
70 Kilby St., Boston, Mass.



The Roger Williams Monument, Providence, R. I. Franklin Simmons, Sculptor.

The Minute Man, Concord, Mass. D. C. French, Sculptor.

Monument to Count Cavour, Milan Italy.



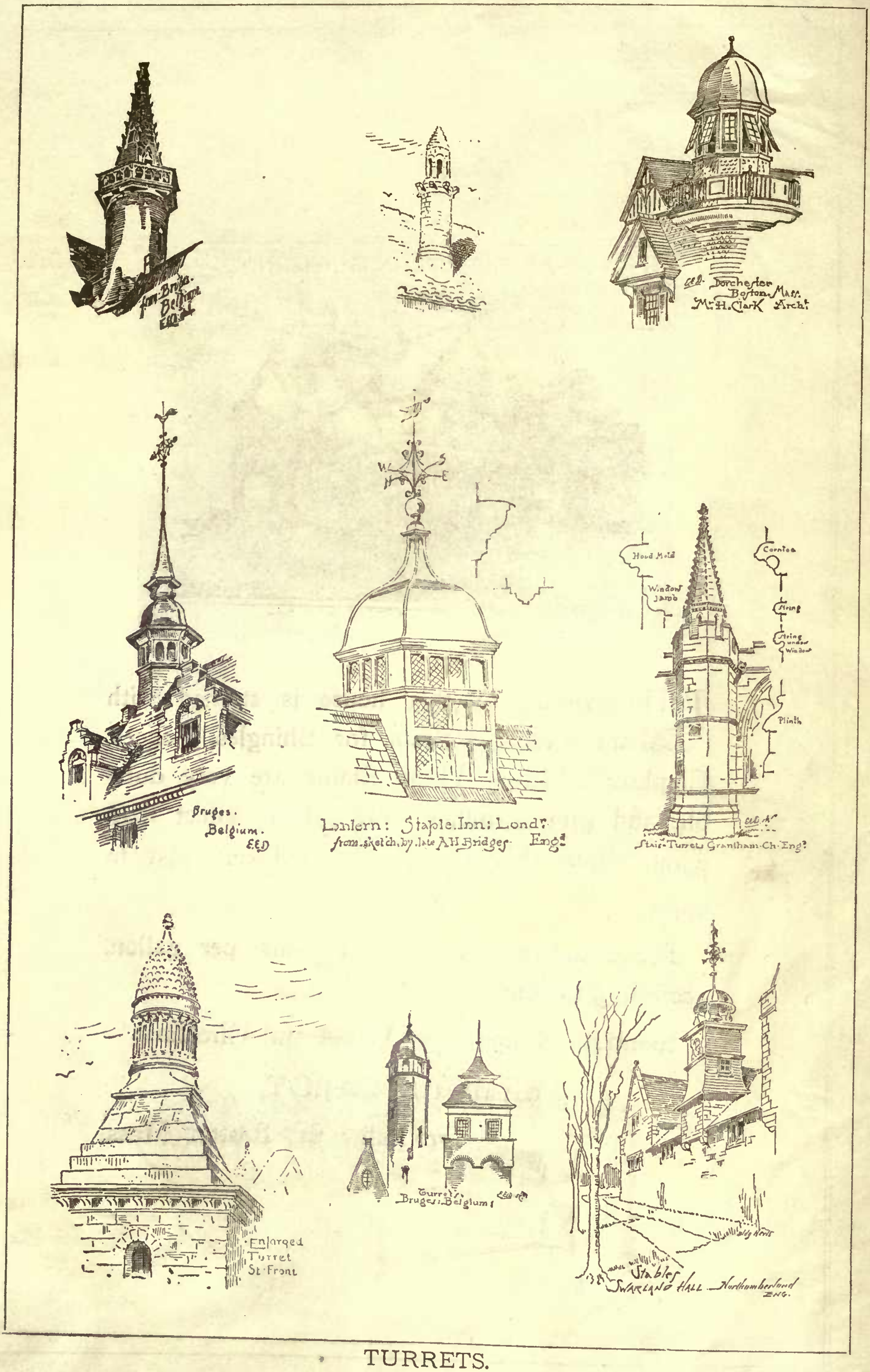
THE exterior of this house is stained with Cabot's Creosote Stain, for Shingles, Fences. Clapboards, Etc. These Stains are very durable and give a much more artistic effect than paint, while they are *cheaper*, and very easy to apply.

Prices are 30, 50, and 75 cents per gallon, according to color.

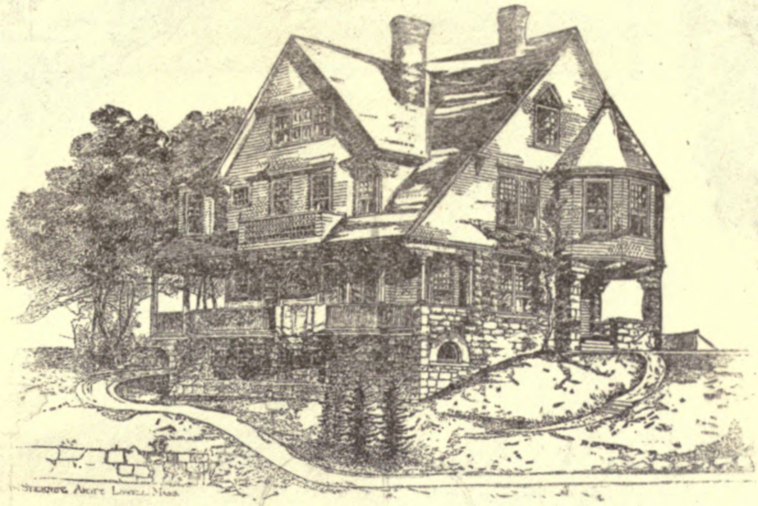
Send for Samples on Wood, and Circulars.

SAMUEL CABOT,

70 Kilby St., Boston, Mass.


from Bruges. Belgium. E.E.D.
Dorchester Boston Mass. Mr H. Clark Archt
Bruges. Belgium. E.E.D.
Lantern: Staple Inn: Lond
from sketch by late A.H. Bridges Eng
Hood Mold
Window Jamb
Cornice
String
Plinth
Stair-Turret: Grantham Ch. Eng
Enlarged Turret St. Front
Turrets Bruges: Belgium
Stables Swarland Hall Northumberland Eng.

TURRETS.



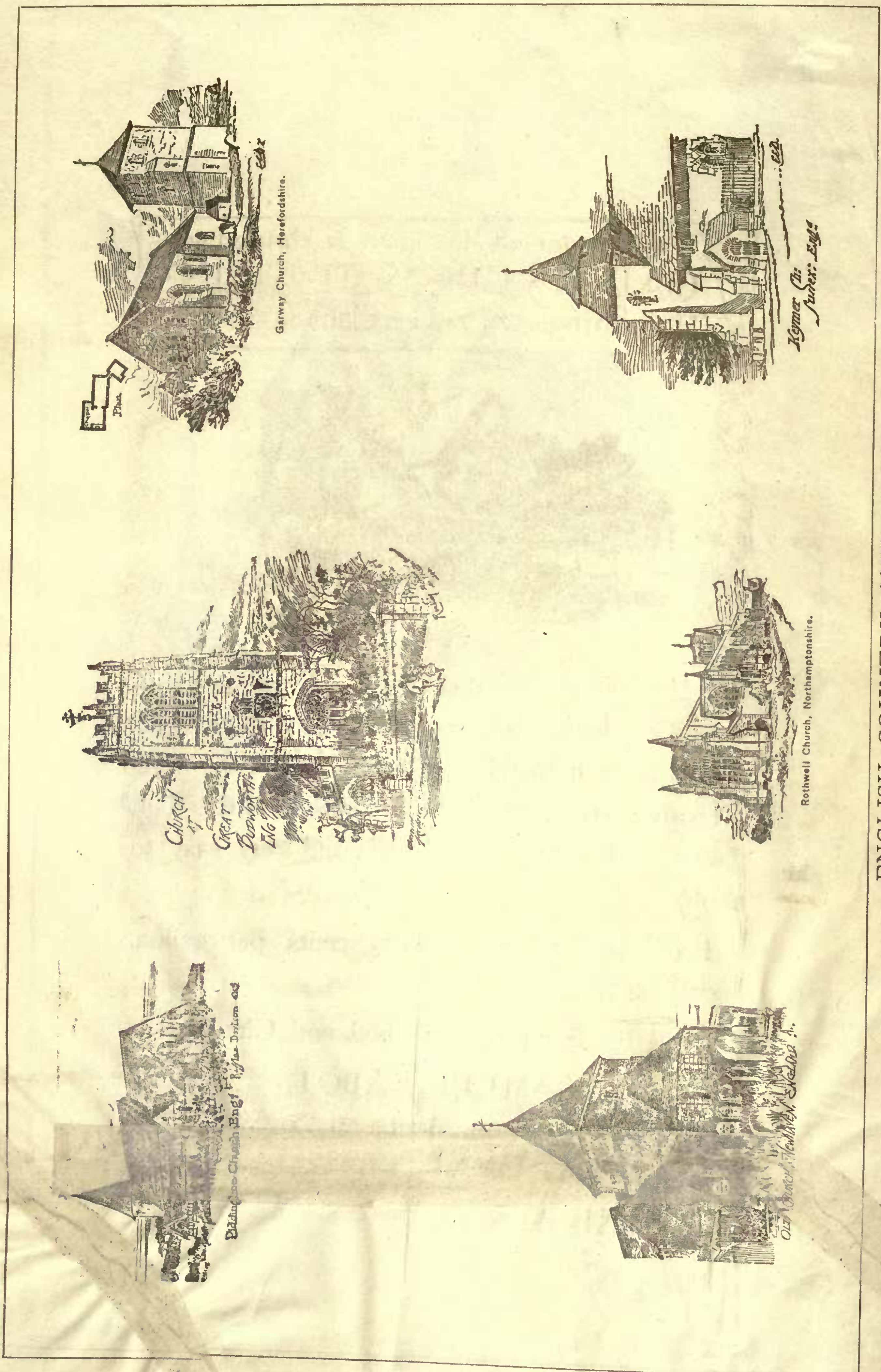
THE exterior of this house is stained with Cabot's Creosote Stain, for Shingles, Fences, Clapboards, Etc. These Stains are very durable and give a much more artistic effect than paint, while they are *cheaper*, and very easy to apply.

Prices are 30, 50, and 75 cents per gallon, according to color.

Send for Samples on Wood, and Circulars.

SAMUEL CABOT,

70 Kilby St., Boston, Mass.



ENGLISH COUNTRY CHURCHES.

The exterior of this house is stained with
CABOT'S CREOSOTE STAIN
for Shingles, Fences, Clapboards Etc.

These Stains are very durable and give a much more artistic effect than paint, while they are cheaper, and very easy to apply:

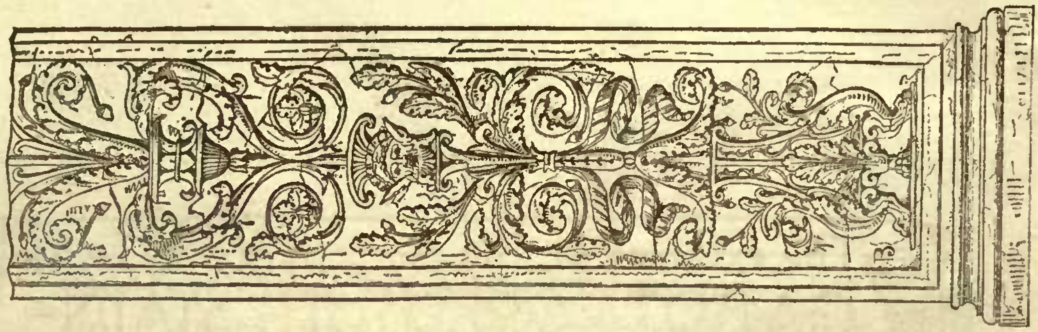
Our Stains contain no water and are the only exterior Stains not adulterated with kerosene:

PRICES ARE 30, 50, AND 75 CENTS PER GALLON ACCORDING TO COLOR

SEND FOR SAMPLES ON WOOD, AND CIRCULARS

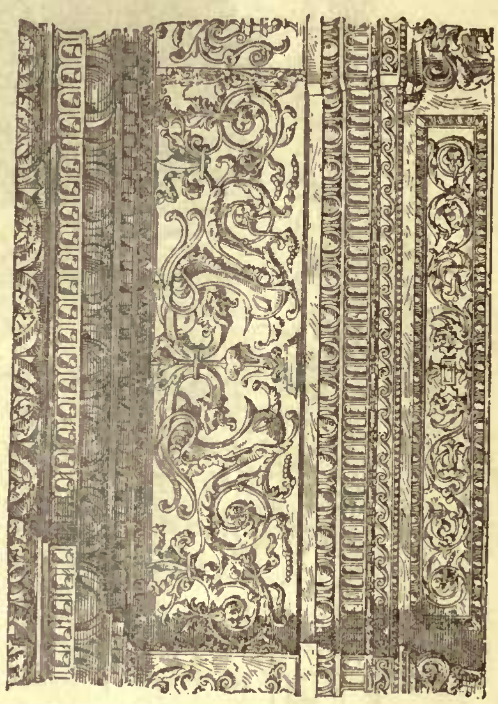
SAMUEL CABOT,
70 KILBY ST. BOSTON MASS.

RENAISSANCE SCULPTURES.



From a White Marble Pilaster in St. Maria del Popolo, Rome.

Old Woodwork at Pistoja.



Portion of a White Marble Pilaster found in the ruins of Adrian's Villa.

The exterior of this house is stained with
CABOT'S CREOSOTE STAIN
for Shingles, Fences, Clapboards Etc.

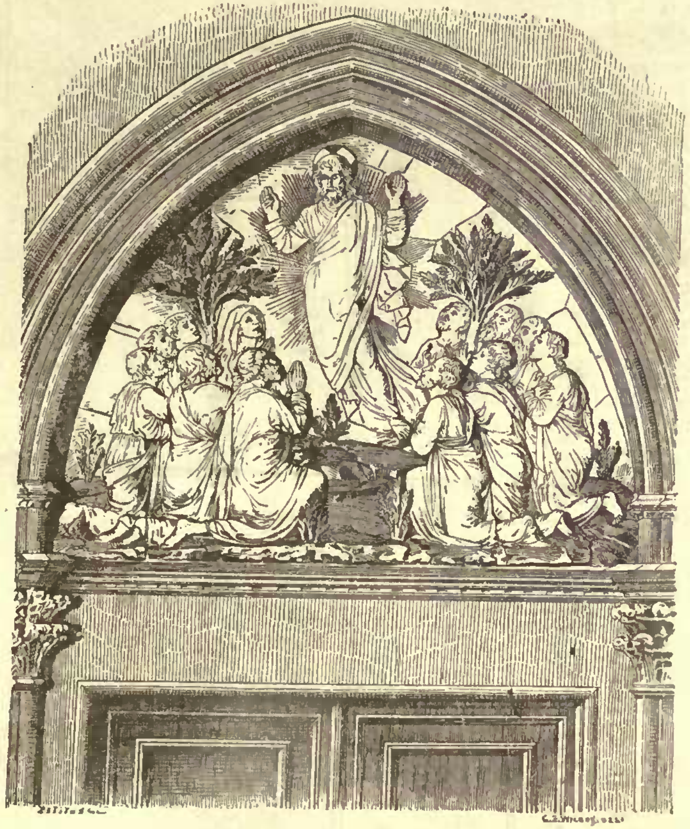
These Stains are very durable and give a much more artistic effect than paint, while they are cheaper, and very easy to apply:

Our Stains contain no water and are the only exterior Stains not adulterated with kerosene:

PRICES ARE 30, 50, AND 75 CENTS PER GALLON ACCORDING TO COLOR
SEND FOR SAMPLES ON WOOD, AND CIRCULARS

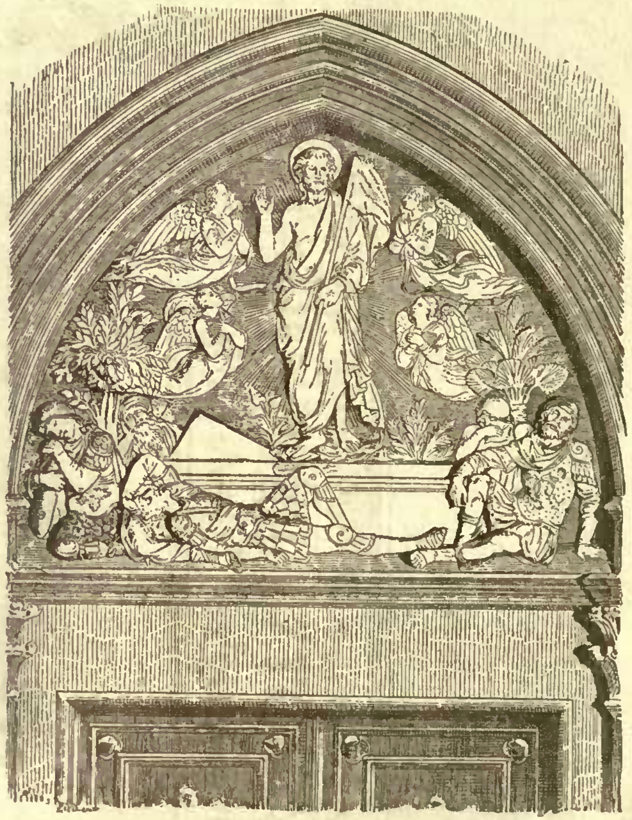
J.E.H

SAMUEL CABOT,
70 KILBY ST. BOSTON, MASS.



"The Ascension." An enamelled Terra-Cotta by Luca Della Robbia, in the Tympanum of a Door of the Sacristy of the Cathedral, Florence. (From L'Art.)

From the Frieze of the Hospital at Pistoja, by Giovanni Della Robbia. (From L'Art.)



"The Resurrection." Enamelled Terra-Cotta by Luca Della Robbia, in the Tympanum of a Door of the Sacristy of the Cathedral, Florence. (From L'Art.)

DELLA ROBBIA SCULPTURE.

The exterior of this house is stained with

CABOT'S CREOSOTE STAIN

for Shingles, Fences, Clapboards Etc

These Stains are very durable and give a much more artistic effect than paint, while they are cheaper, and very easy to apply:

Our Stains contain no water and are the only exterior Stains not adulterated with kerosene:

PRICES ARE 30, 50, AND 75 CENTS PER GALLON ACCORDING TO COLOR

SEND FOR SAMPLES ON WOOD, AND CIRCULARS

J.E.H

SAMUEL CABOT,

70 KILBY ST. BOSTON MASS

Medallion by Andrea Della Robbia from the Hospital of the Innocents, Florence
(From L'Art.)

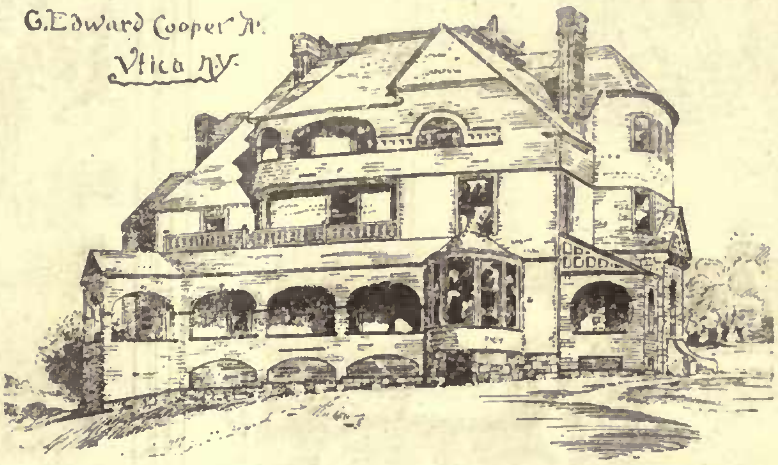
"The Madonna a la Pomme;" an anemelled Terra-Cotta
by Luca Della Robbia. (From L'Art.)

Plaque in the South Kensington Museum attributed to Luca Della Robbia.

From tha Frieze of the Hospital at Pistoje, by Giovanni Della Robbia.

DELLA ROBBIA SCULPTURE.

The exterior of this house is stained with
CABOT'S CREOSOTE STAIN
for Shingles, Fences, Clapboards Etc.



These Stains are very durable and give a much more artistic effect than paint, while they are cheaper, and very easy to apply:

Our Stains contain no water and are the only exterior Stains not adulterated with kerosene:

PRICES ARE 30, 50, AND 75 CENTS PER GALLON
ACCORDING TO COLOR
SEND FOR SAMPLES ON WOOD, AND CIRCULARS

J.E.H

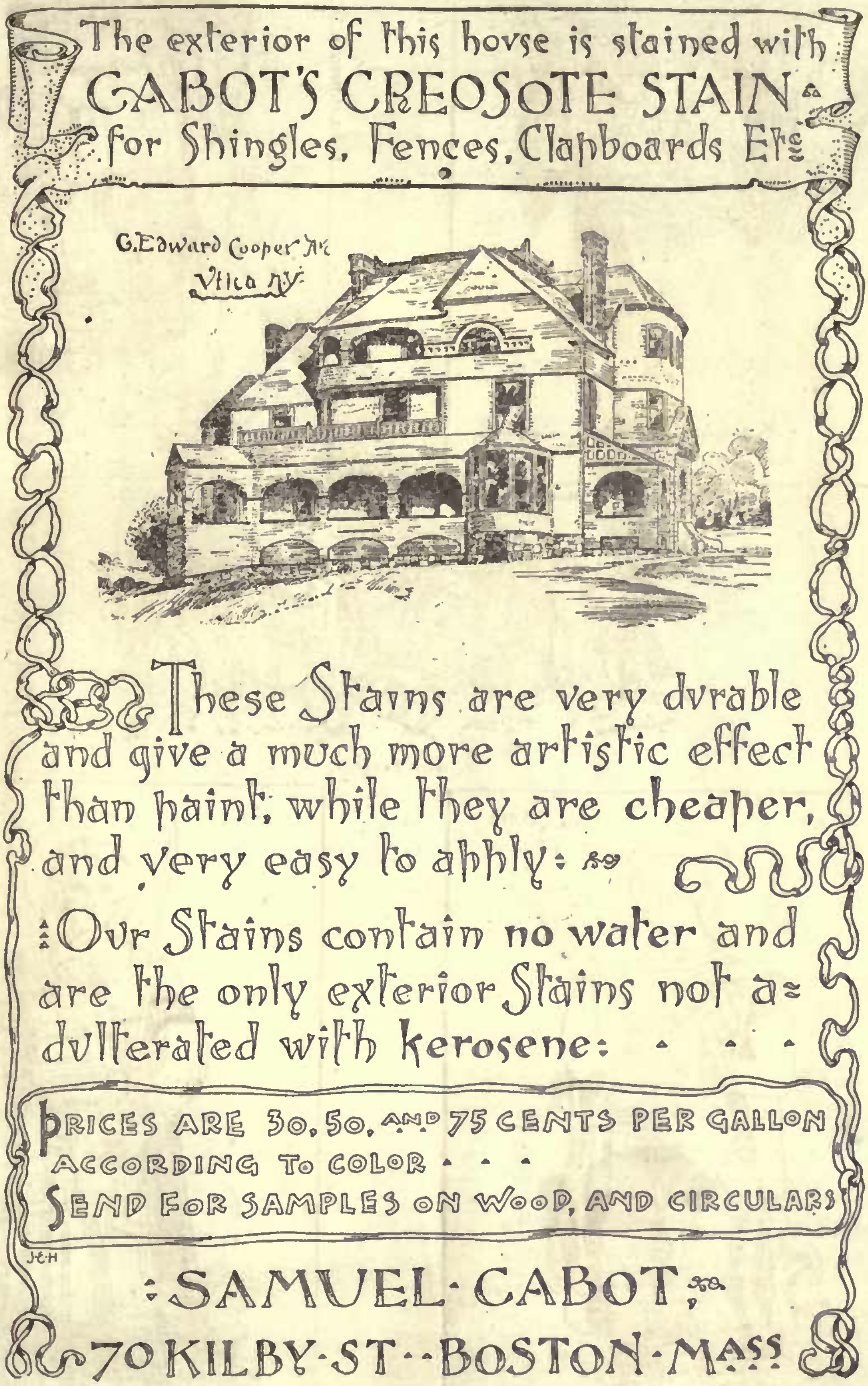
SAMUEL CABOT,
70 KILBY·ST·· BOSTON·MASS

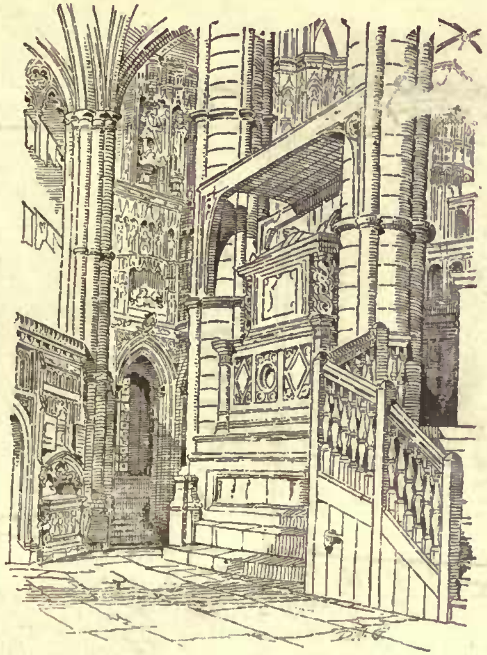
Mural Paintings from Mt. Athos, now in the Louvre.

D. Mural Painting

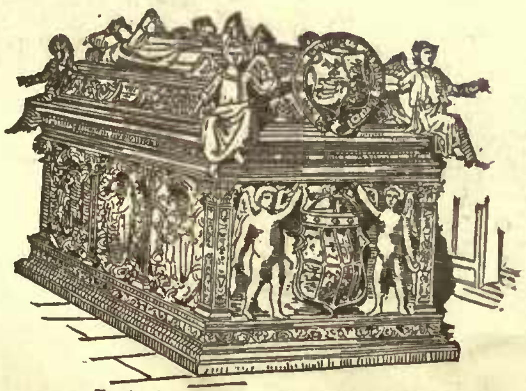
Mural Paintings from Mt. Athos, now in the Louvre.

MURAL PAINTINGS.


The exterior of this house is stained with
CABOT'S CREOSOTE STAIN
for Shingles, Fences, Clapboards Etc.
G. Edward Cooper Arc.
Utica N.Y.
These Stains are very durable and give a much more artistic effect than paint, while they are cheaper, and very easy to apply:
Our Stains contain no water and are the only exterior Stains not adulterated with kerosene:
PRICES ARE 30, 50, AND 75 CENTS PER GALLON ACCORDING TO COLOR
SEND FOR SAMPLES ON WOOD, AND CIRCULARS
J.E.H.
SAMUEL CABOT,
70 KILBY ST. BOSTON MASS.

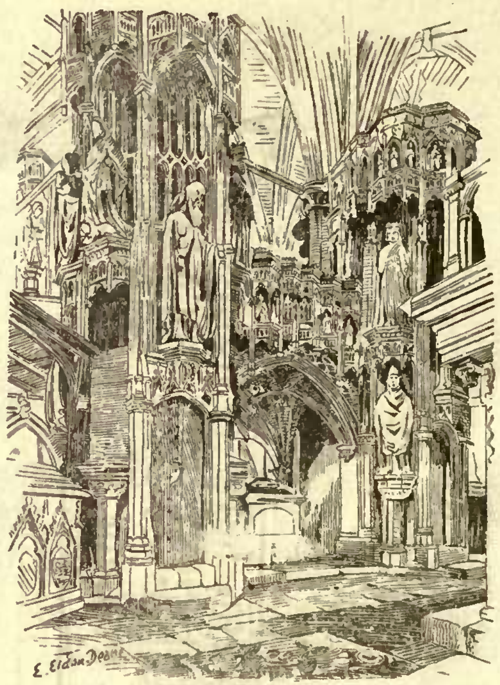


Entrance to Chapel of Edward the Confessor, Westminster Abbey.



Tomb of Henry VII, Westminster Abbey.

The Nightingale monument, 1758, Westminster Abbey. Roubiliac, Sculptor.

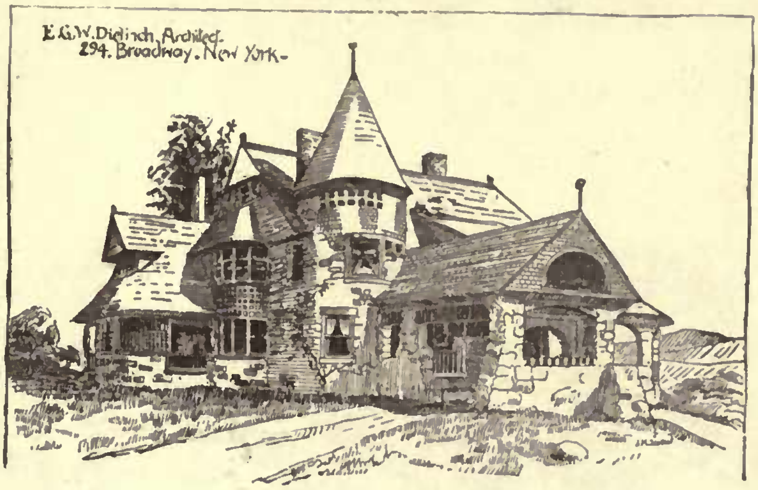


Shrine of Henry V, Westminster Abbey.

Monument to Lord Chetham, Westminster Abbey, Bacon, Sculptor.

TOMBS IN WESTMINSTER ABBEY.

The exterior of this house is stained with
CABOT'S CREOSOTE STAIN
for Shingles, Fences, Clapboards Etc.



These Stains are very durable and give a much more artistic effect than paint, while they are cheaper, and very easy to apply:

Our Stains contain no water and are the only exterior Stains not adulterated with kerosene: . . .

PRICES ARE 30, 50, AND 75 CENTS PER GALLON ACCORDING TO COLOR . . .
SEND FOR SAMPLES ON WOOD, AND CIRCULARS

J.E.H.

SAMUEL · CABOT,
70 KILBY · ST · · BOSTON · MASS

Thomas Paine. D. Richards, Sculptor.

William Wilberforce, Westminster Abbey. Joseph, Sculptor.

Group of Working Woman and Child on the base of a Monument at Creusot, France erected to the memory of the Propriator of a great Iron works. Chapu, Sculptor.

From a French Mantle Clock.

Alexander Dumas, Paris. Gustave Dore, Sculptor.

SITTING STATUES.

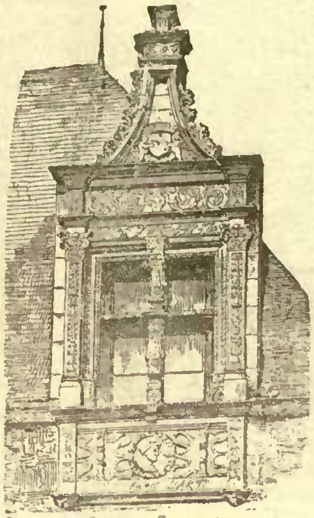
The exterior of this house is stained with
CABOT'S CREOSOTE STAIN
for Shingles, Fences, Clapboards Etc.

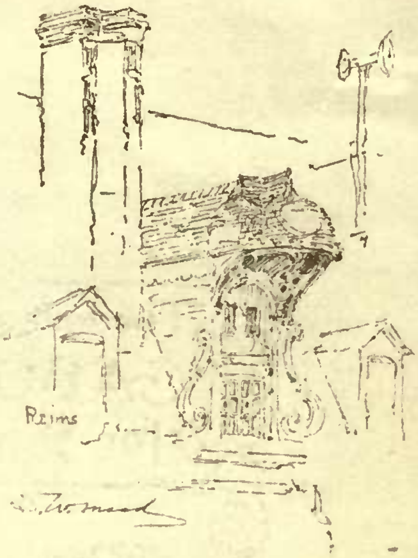
These Stains are very durable and give a much more artistic effect than paint, while they are cheaper, and very easy to apply:

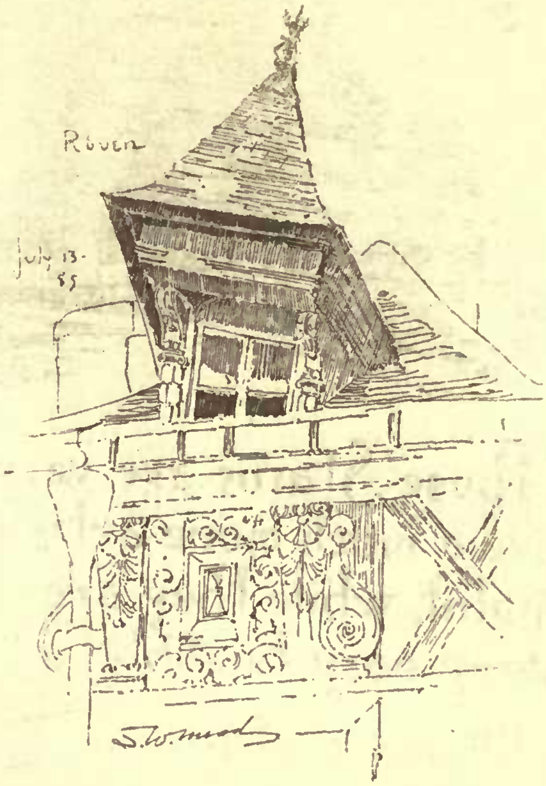
Our Stains contain no water and are the only exterior Stains not adulterated with kerosene:

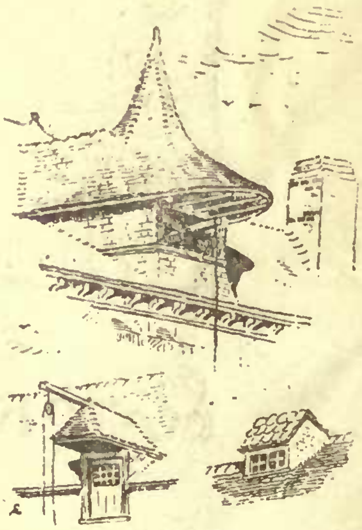
PRICES ARE 30, 50, AND 75 CENTS PER GALLON ACCORDING TO COLOR
SEND FOR SAMPLES ON WOOD, AND CIRCULARS

SAMUEL CABOT,
70 KILBY ST. BOSTON MASS.





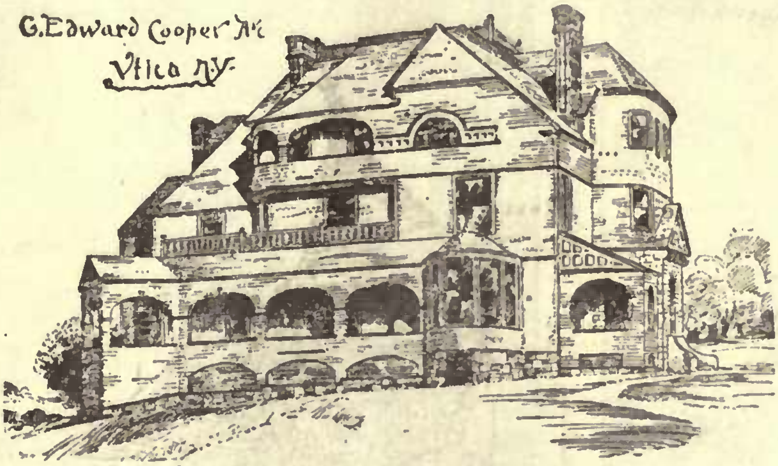




From Normandy.

DORMERS.

The exterior of this house is stained with
CABOT'S CREOSOTE STAIN
for Shingles, Fences, Clapboards Etc.

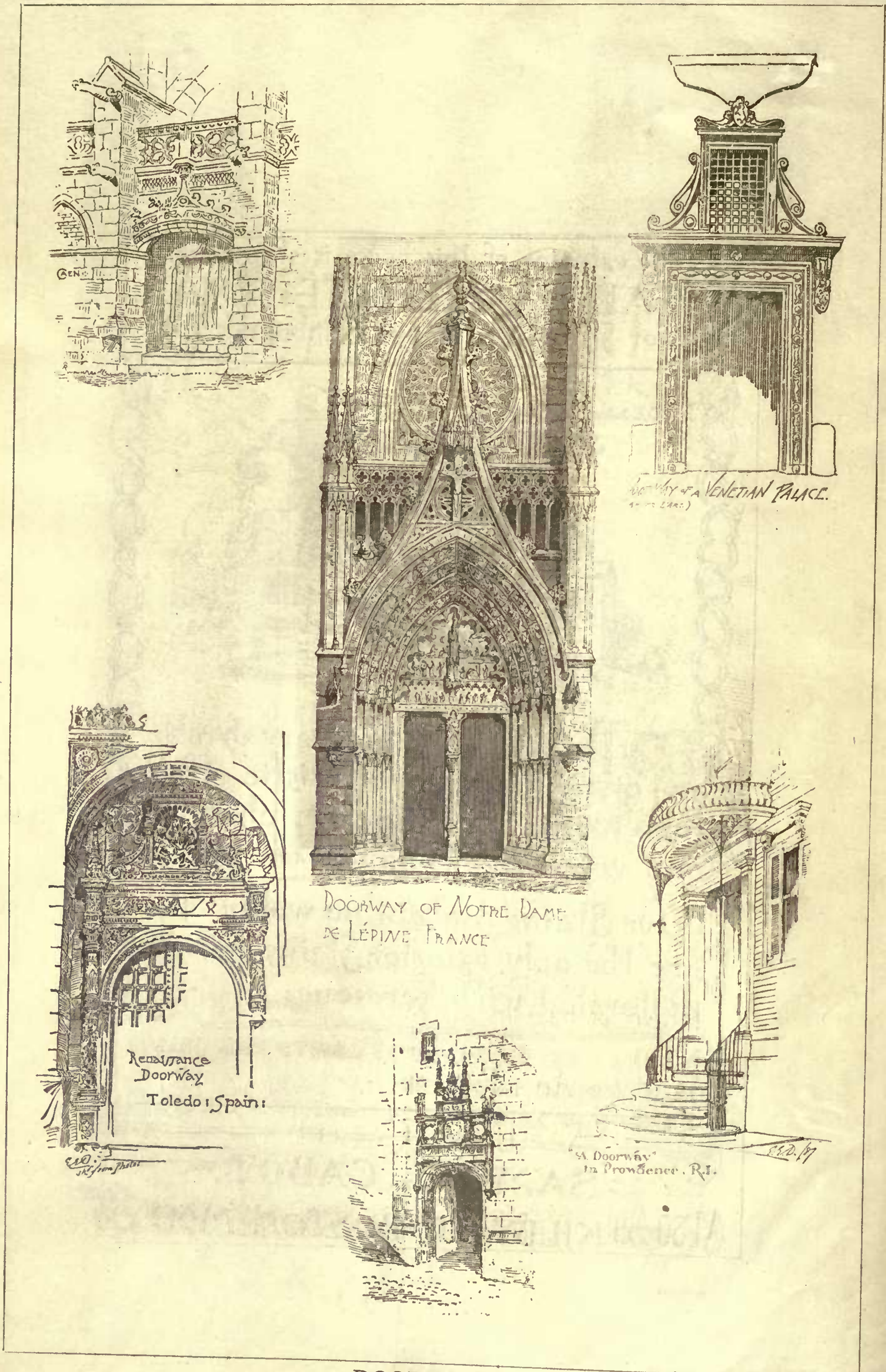


These Stains are very durable and give a much more artistic effect than paint, while they are cheaper, and very easy to apply:

Our Stains contain no water and are the only exterior Stains not adulterated with kerosene:

PRICES ARE 30, 50, AND 75 CENTS PER GALLON
ACCORDING TO COLOR
SEND FOR SAMPLES ON WOOD, AND CIRCULARS

SAMUEL CABOT,
70 KILBY ST. BOSTON MASS.


CAEN
VENETIAN PALACE.
DOORWAY OF NOTRE DAME DE LÉPINE FRANCE
Renaissance Doorway Toledo : Spain :
"A Doorway" in Providence, R.I.

DOORWAYS.

Ye defeate of ye moderne Apollyon

With this material wood-work can be thoroughly protected from fire at a cost of less than one cent per square foot.

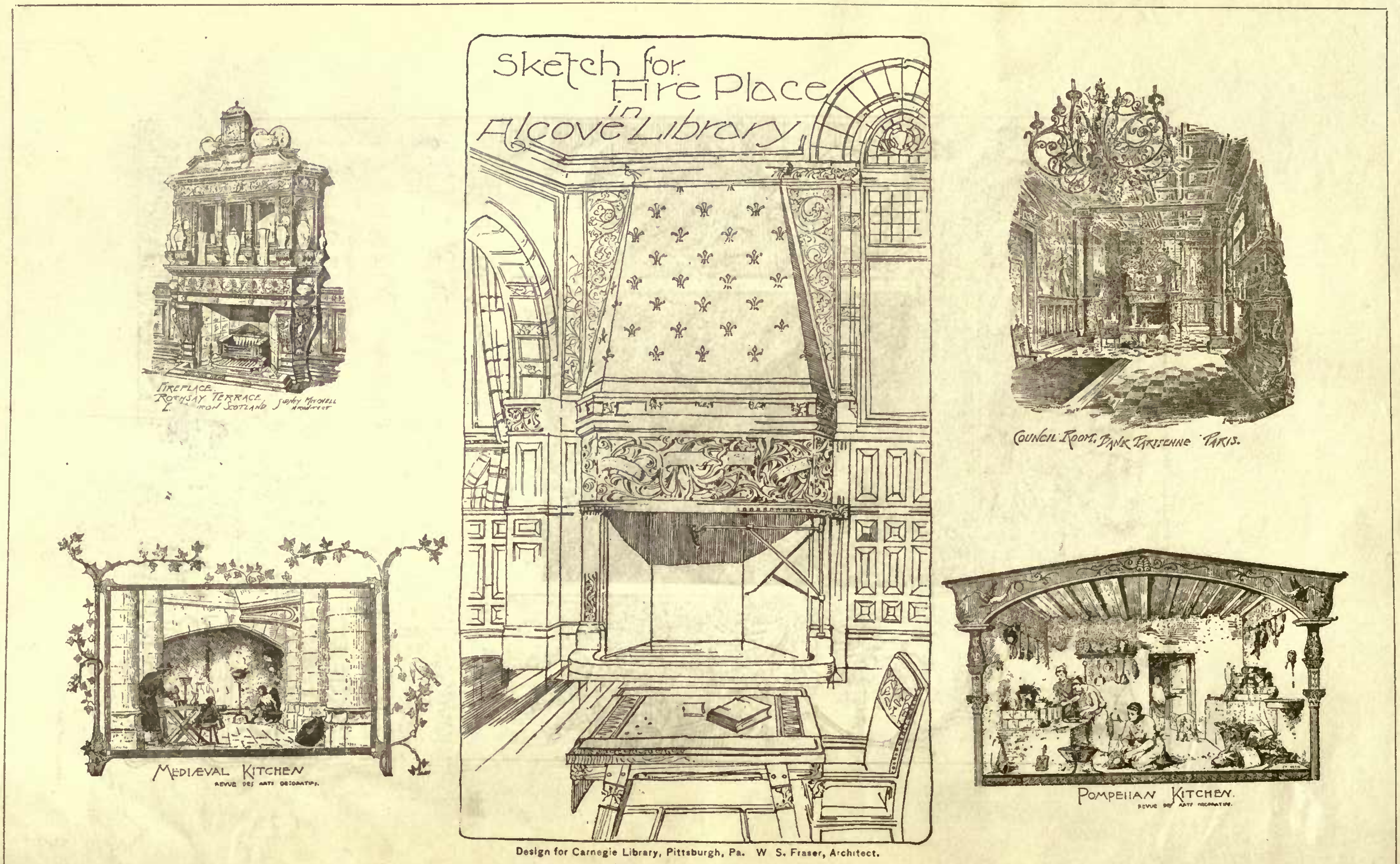
It can be had in all colors at 30 cents per gallon.

Send for Anti-Pyre circulars and samples

SAMUEL CABOT

70 KILBY ST. BOSTON, MASS.

ALSO SOLE MAN'FR. CREOSOTE SHINGLE STAINS.



Design for Carnegie Library, Pittsburgh, Pa. W S. Fraser, Architect.

FIREPLACES.

Ye defeate of ye moderne Apollyon

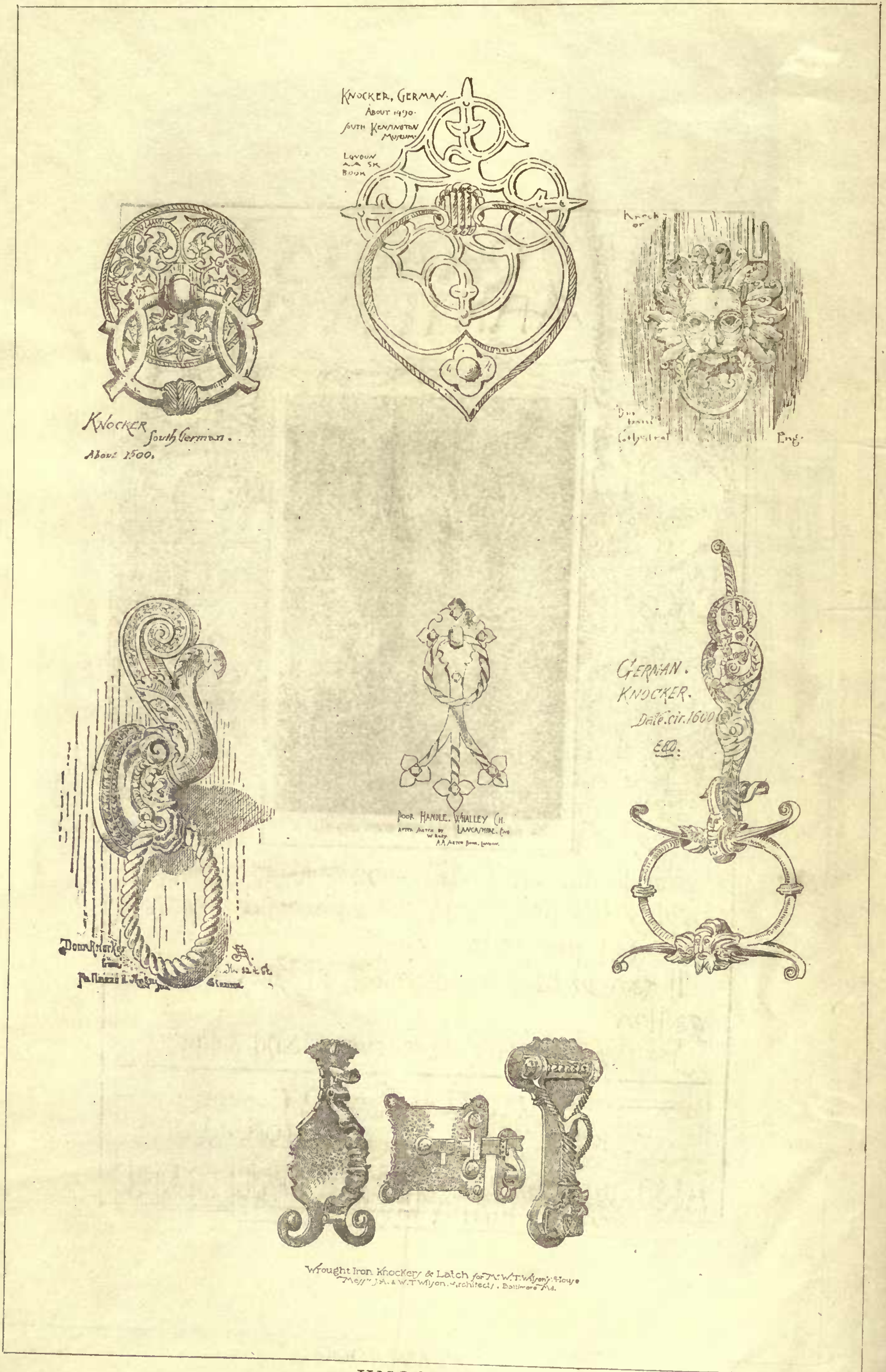
With this material wood-work can be thoroughly protected from fire at a cost of less than one cent per square foot.

It can be had in all colors at 30 cents per gallon.

Send for Anti-Pyre circulars and samples.

SAMUEL CABOT
70 KILBY ST. BOSTON, MASS.

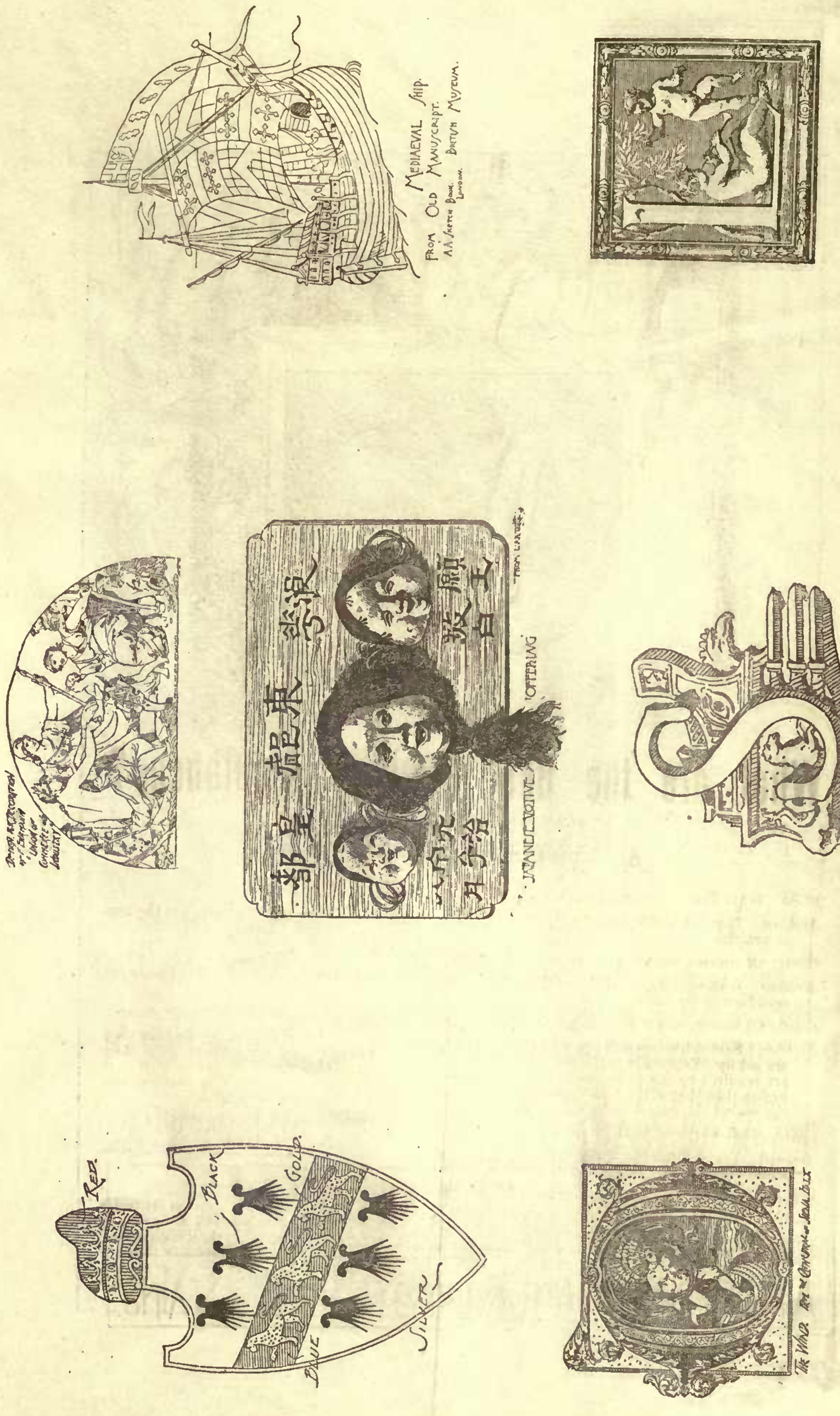
ALSO SOLE MAN'F'R. CREOSOTE SHINGLE STAINS.



Knocker, German. About 1490. South Kensington Museum. London A.A. Sk Book
Knocker South German. About 1500.
Eng.
German. Knocker. Date cir. 1600 E.C.D.
Door Handle. Whalley Ch. Lancashire. Eng
Wrought Iron Knockers & Latch for Mr W. T. Wilson's House
Messrs J. A. & W. T. Wilson, Architects, Baltimore Md.

KNOCKERS.

CABOT'S
ANTI-PYRE
ANTI-PYRE
Ye defeate of ye moderne Apollyon
With this material wood-work can be thoroughly protected from fire at a cost of less than one cent per square foot.
It can be had in all colors at 30 cents per gallon.
Send for Anti-Pyre circulars and samples.
SAMUEL CABOT
70 KILBY ST. BOSTON. MASS.
ALSO SOLE MAN'F'R. CREOSOTE SHINGLE STAINS.


MEDIAEVAL SHIP.
FROM OLD MANUSCRIPT.
BRITISH MUSEUM.
FROM PIRANESI.
RED.
BLACK
GOLD.
BLUE
SILVER

TAIL PIECES.

What are the Best Sanitary Appliances?

A DISCUSSION.

Client: What kind of plumbing fixtures shall I put in my house?

Architect: That is a pretty broad question. You want those not only the best in theory, but the best in practice.

Client: Of course; but the question remains,—what are the best?

Architect: Water-closets are the most important item. Personally, I think I have the best I have yet seen here in my office.

Client: Of course, cost is some object; I suppose a wash-out closet is good, and it is certainly cheap.

Architect: Some closets which are very cheap as to first cost are the most expensive by the time they are set up .Especially is this true of the wash-outs. Very cheap as they appear in the lists, they are required by law to be back-vented to prevent siphonage, and this inevitably brings their cost higher than that of the best siphon closets. Then, too, their contained water is very shallow, and the seal of the trap is seldom as much as two inches. But see this. [Shows closet.]

Client: That works well; there seems to be a powerful suction there,—and how clean it is!

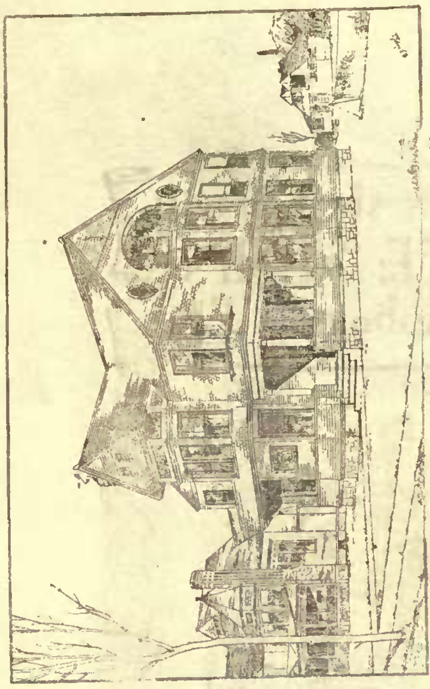
Architect: Yes; I think so. I like it because it is so simple. It requires no back-venting, has but one supply-pipe and no valve, and its depth of water in the bowl is seven inches.

Client: [Noticing name.] How do you pronounce that name?

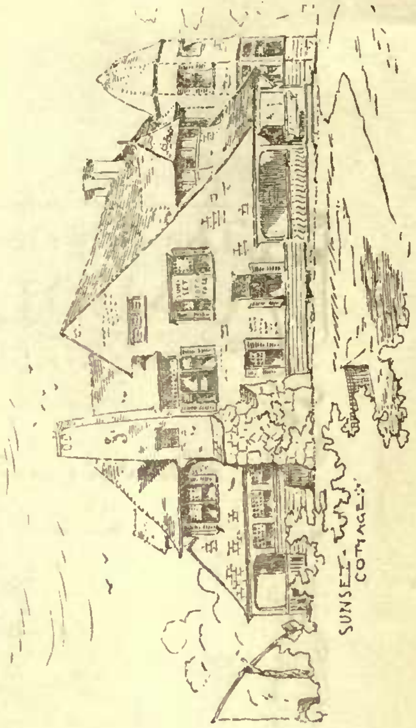
Architect: De-se-kō. Wonder what the word means! Now it is possible that this closet is set under exceptionally favorable circumstances, or that it is a selected closet. You say you are going on by the Fall River Line to-night; well, there are some twenty odd "Dececos" on the *Bristol, Providence* and *Old Colony* boats. Suppose you take a look at them to-night, and see how they are working.

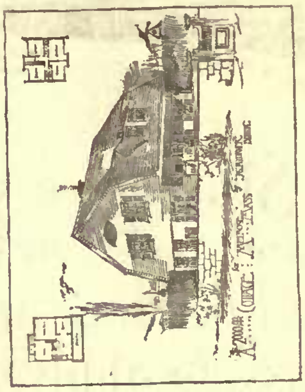
Client: I'll do so, and now I must be off. Good-bye.

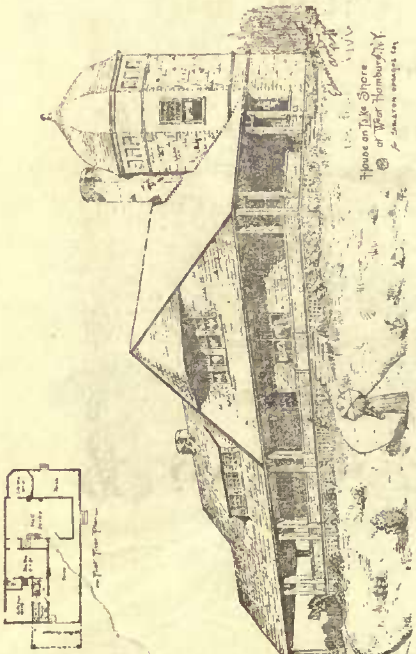
COTTAGES.

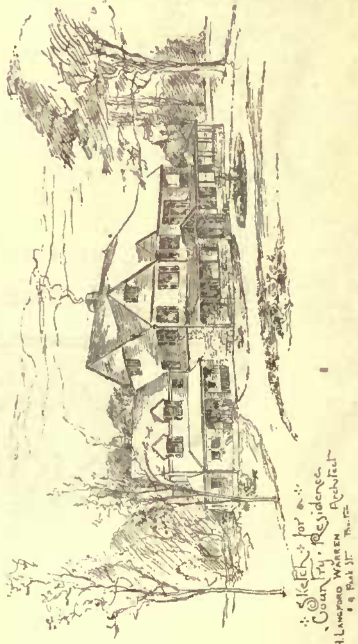


House for Wm. H. Duffett, Esq., Rochester, N. Y.
Walker & Nolan, Architects.

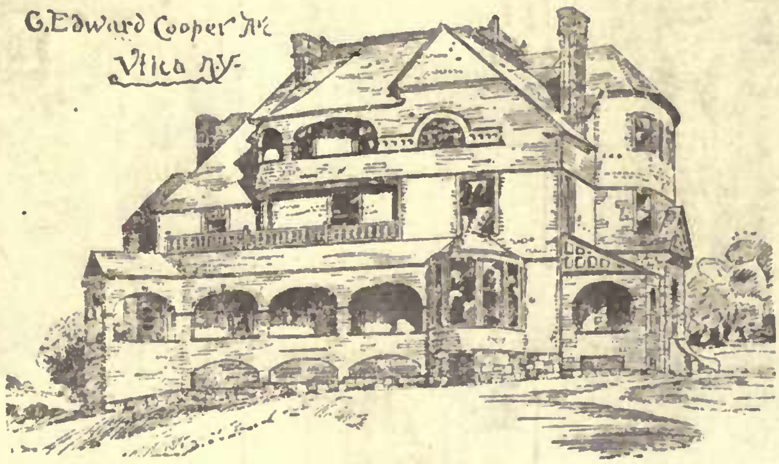








The exterior of this house is stained with
CABOT'S CREOSOTE STAIN
for Shingles, Fences, Clapboards Etc.



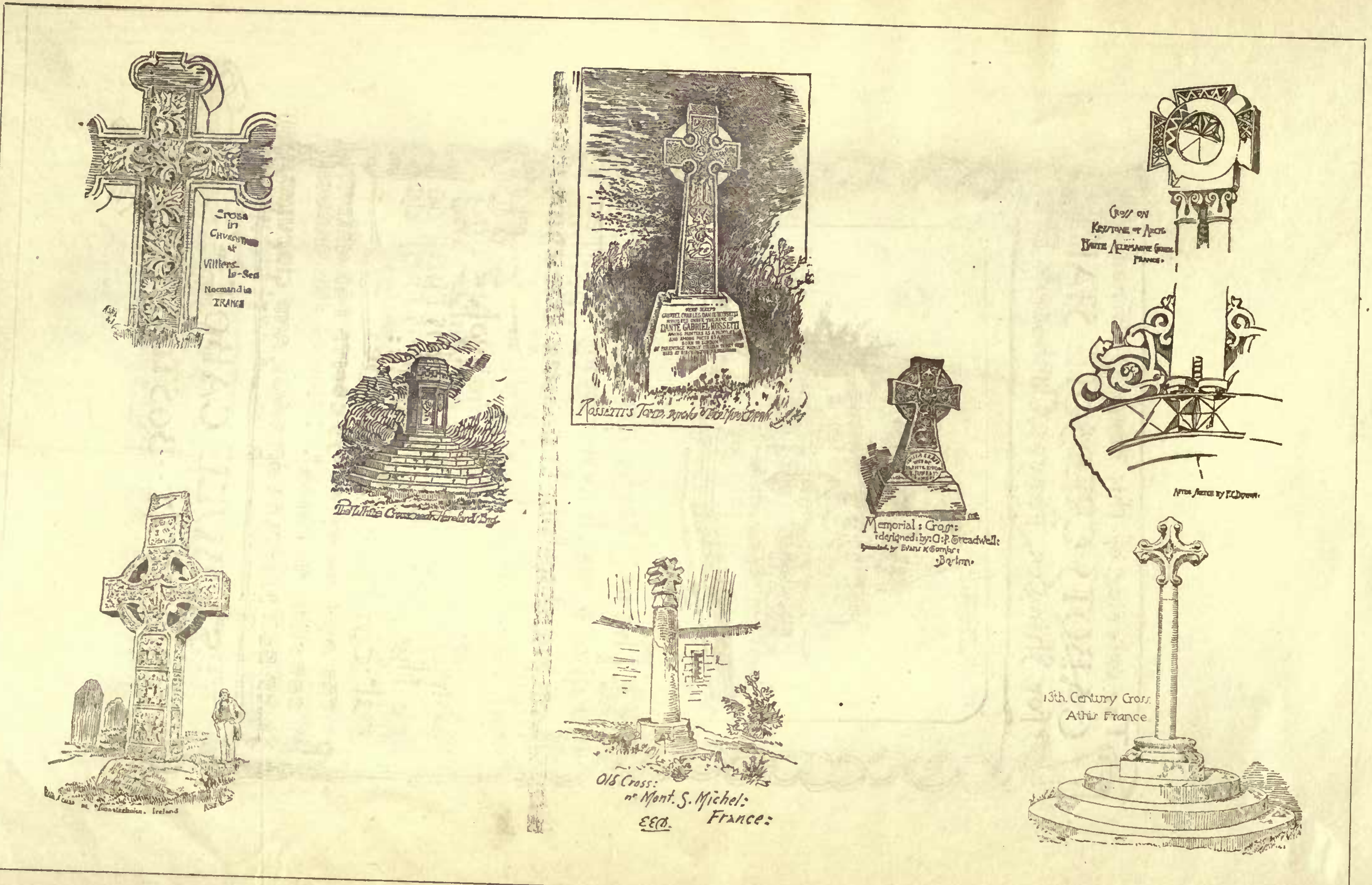
These Stains are very durable and give a much more artistic effect than paint, while they are cheaper, and very easy to apply:

Our Stains contain no water and are the only exterior Stains that do not contain kerosene:

PRICES ARE 30, 50, AND 75 CENTS PER GALLON ACCORDING TO COLOR
SEND FOR SAMPLES ON WOOD, AND CIRCULARS

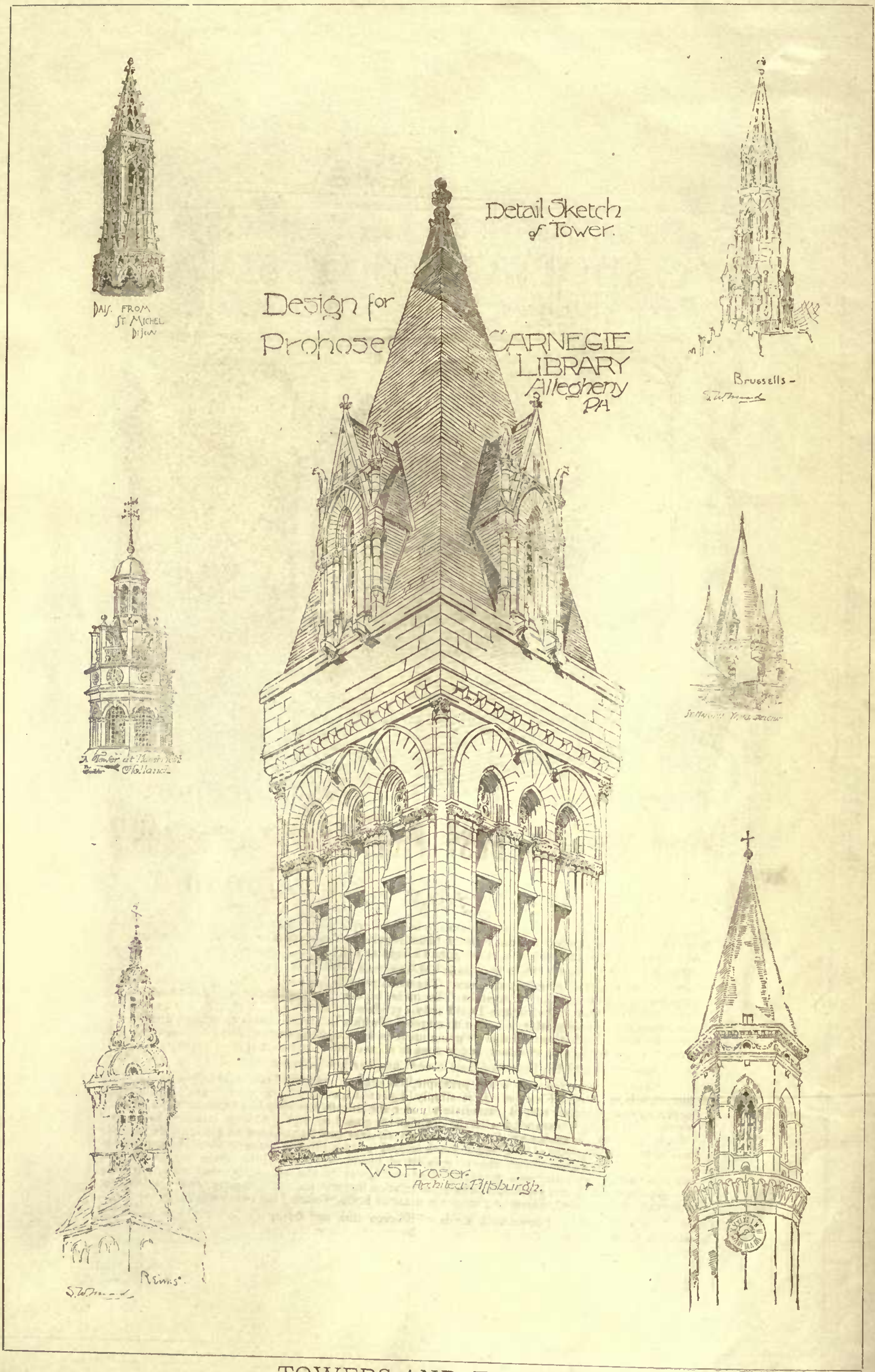
J.E.H.

SAMUEL CABOT,
70 KILBY ST. BOSTON MASS.

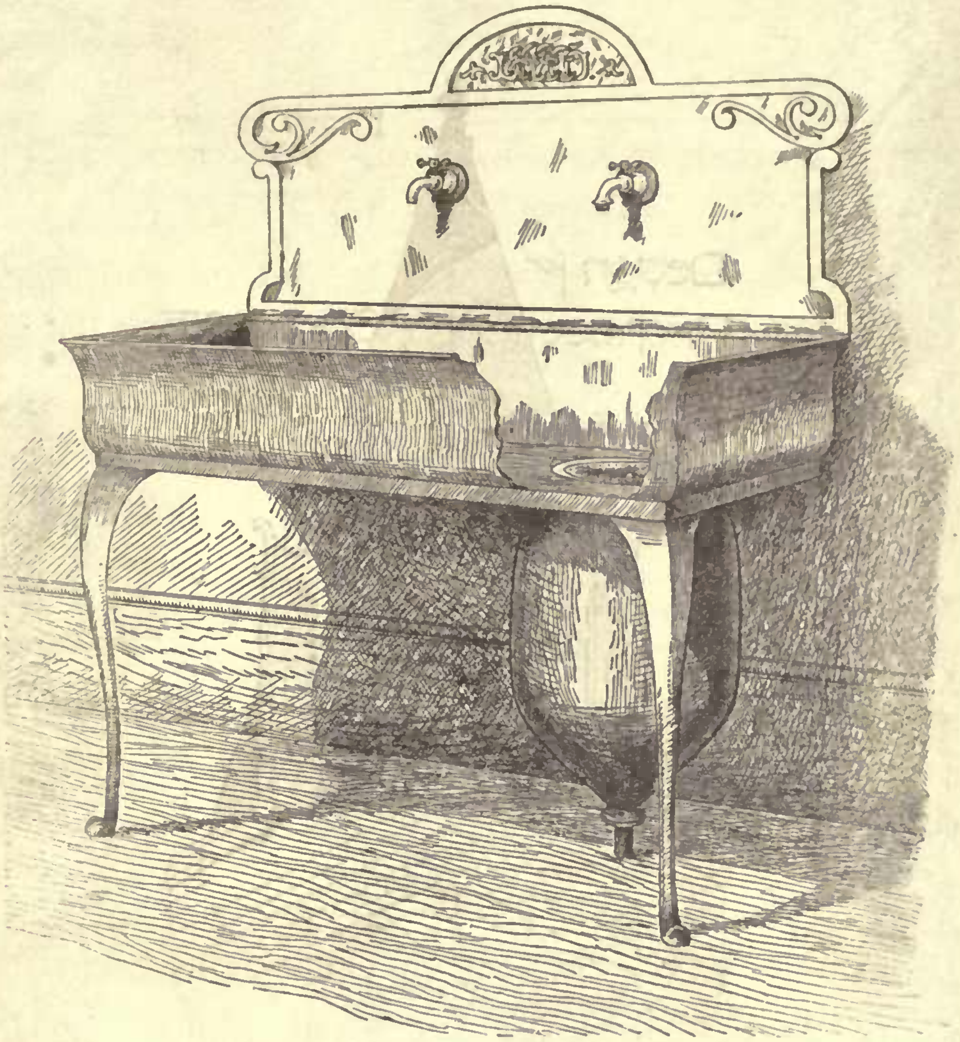


SEPULCHRAL CROSSES.

The exterior of this house is stained with
CABOT'S CREOSOTE STAIN
for Shingles, Fences, Clapboards Etc.
J. C. WORTHINGTON, ARCHITECT.
These Stains are very durable and give a much more artistic effect than paint, while they are cheaper, and very easy to apply:
Our Stains contain no water and are the only exterior Stains that do not contain kerosene:
PRICES ARE 30, 50, AND 75 CENTS PER GALLON ACCORDING TO COLOR
SEND FOR SAMPLES ON WOOD, AND CIRCULARS
J.E.H.
SAMUEL CABOT,
70 KILBY ST. BOSTON MASS.



TOWERS AND TURRETS.



What are the Best Plumbing Appliances?

A DISCUSSION. (CONTINUED.)

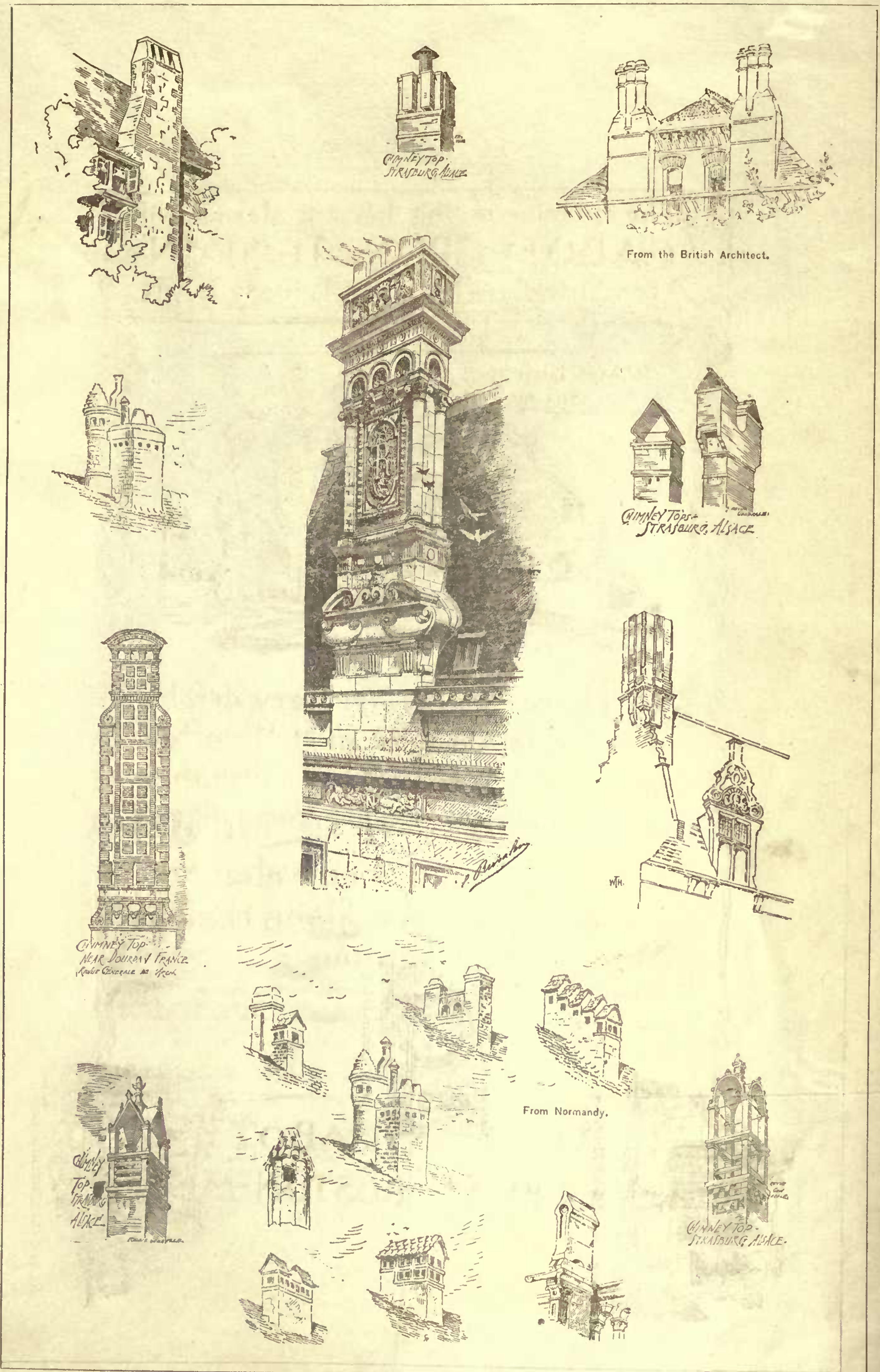
Client: I see that the Dececo Company claims to have a device that obviates the stopping up of drains but I don't understand just what it is. I had a regular monkey-and-parrot-time with my kitchen drain last winter. It proved to be plugged as tight as a drum.

Architect: Of course, the trouble is an almost universal one. It comes from the coagulation of the grease which gets so largely into sinks. The usual remedy has been to place in the course of the drain a "grease-trap," *i. e.*, a vessel with an outlet higher than the inlet, which allows the grease to settle to the bottom, while the liquid only over-flows. Of course, as soon as the grease-trap gets full of the solid matter, it has to be emptied,—which is a more or less expensive and always a nasty job. While this operation is going on, it is inevitably a very active little nuisance. In fact, it is simply a small cesspool, and is open to all the objections that apply to such.

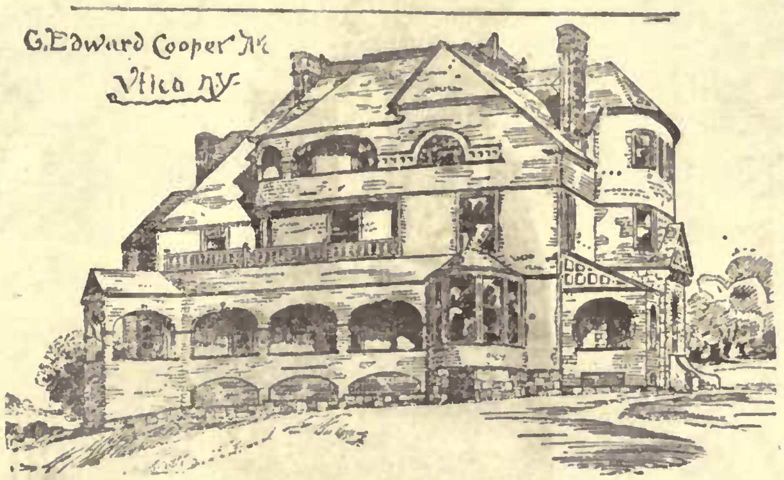
Client: I know all that; but how does the Dececo Company get around it?

Architect: They do it by a device whose principle, like that of most first-rate inventions, is absurdly simple. It is called a *Flushpot.* It is simply a pear-shaped pot of iron or brass, holding about seven gallons, which is placed immediately under the sink (which may be of iron or wood or soap-stone). Its outlet is connected with the drain and is closed by a plug of brass attached to the end of a spindle which reaches up through the usual strainer and terminates in a knob. In use, the outlet of the flushpot is closed, and the sink is used in the ordinary manner until the pot has become filled with water. Then the plug is lifted by the spindle, and the whole volume of seven gallons rushes out, acting as a powerful flush and scour to the wastepipe and drain, carrying everything with it, and preventing any accumulation by its force. For pantry sinks, where not so much water is used, a smaller flushpot is made of brass, working in the same manner.

Client: That's enough; put down both kinds of Dececo sink and flushpot. We'll decide later what sizes to have.


Chimney Top Strasburg Alsace
From the British Architect.
Chimney Tops Strasburg, Alsace
WTH.
Chimney Top Near Dourdan France
From Normandy.
Chimney Top Strasburg Alsace
Chimney Top Strasburg Alsace.

The exterior of this house is stained with
CABOT'S CREOSOTE STAIN
for Shingles, Fences, Clapboards Etc.



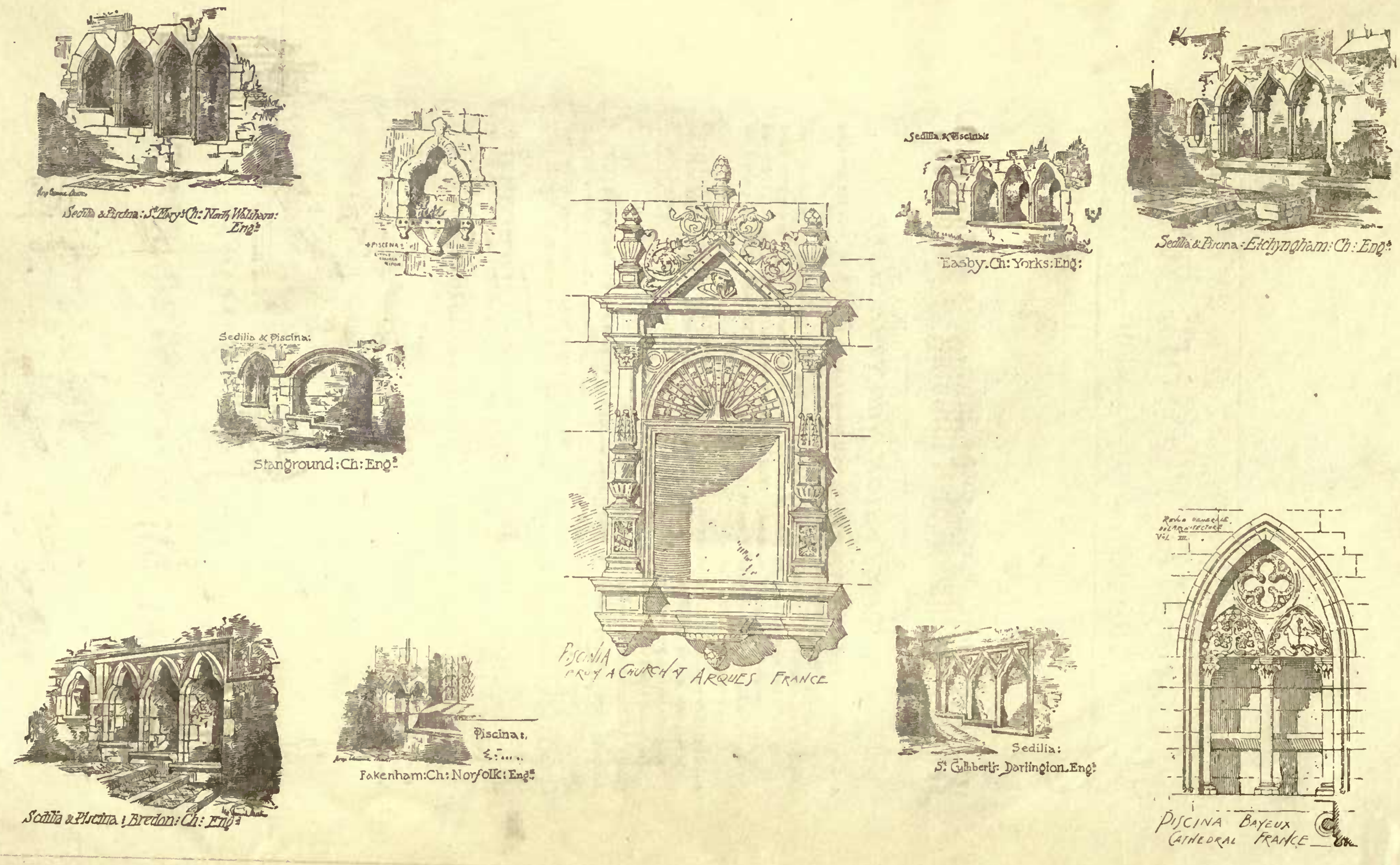
These Stains are very durable and give a much more artistic effect than paint, while they are cheaper, and very easy to apply:

Our Stains contain no water and are the only exterior Stains that do not contain kerosene:

PRICES ARE 30, 50, AND 75 CENTS PER GALLON ACCORDING TO COLOR . . .
SEND FOR SAMPLES ON WOOD, AND CIRCULARS

J.E.H

SAMUEL CABOT,
70 KILBY ST. BOSTON, MASS.



SEDILIAS AND PISCINAS.

What are the Best Plumbing Appliances?

A DISCUSSION. (CONTINUED.)

Architect: Before we forget it, let us return to water-closets a moment and decide how the Dececos shall be set, — that is, in wood or tile or slate or marble.

Client: I want either tile or marble. I saw a closet set in New York in a sort of compartment, with floor, back and sides each of one piece of marble. A trunnion was cut on the seat which fitted in a depression in the top of the marble sides. It was very neat, but on the whole, I believe I like the sides, whether of wood or marble, a little higher, and in that case I don't see how I can have the swinging seat because —

Architect: Yes you can. The Dececo people made what they call a "seat support" of nickle-plated brass; also a seat of different kinds of wood handsomely made and arranged to work with the supports just as you have described. These supports (See ad. in *American Architect* of June 2) are made with bolt fastenings for marble sides and with screws for wooden sides.

Client: But I don't know just how much room I shall have.

Archtect: That makes no difference. They make the seats to order of any required length.

Client: All right. I want to have the seats turn back because I am going to use my closets for slop-hoppers. In his "*How to Drain a House*" Col. Waring says one does not need a slop-hopper with a modern water-closet, that they entail a useless expense and a complication of the plumbing work.

Architect: I am glad you have read the book. If our clients would even in a general way try to make themselves acquainted with the principles of house-making, we architects would have a much smoother road to travel. It is a duty which each man owes to himself. Otherwise he is liable to be hurt, not "in the house of a friend," but in his own, perhaps even without knowing it.

'' History '' by Paul Dubois. For the L[illegible],
Nantas, France.

'Au'd Lang Syne." David Richards, Sculptor.

' Labor,'' Post Office, Boston, Mass. D. C. French, Sculptor.

Charles James Fox, Westminster Abbey. Westmacott, Sculptor.

SITTING STATUES.

What are the Best Sanitary Appliances?

A DISCUSSION. (CONTINUED.)

Client: I was reading in an old *Century* the other day an article by Col. Waring in which he gives the ordinary set wash bowl a very bad character. Has the Dececo Company anything better to offer, or have we got to go back to the hand bowl and pitcher?

Architect: I think it has answered the just objections to the ordinary bowl, with its plug and chain, its tiny half-clogged outlet and dirty hidden overflow, very completely.

Client: How so?

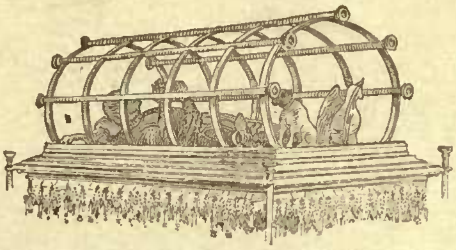
Architect: With a recessed bowl, made in different tints, either round or oval, with a plated standing pipe that stands in the recess out of the way. This pipe is raised from its seat, by turning a spindle that sets into its open top and projects up through the marble slab. One third of a turn raises the pipe and holds it there until the bowl empties; reversing the motion returns it to its seat. The outlet is large giving a good scour to the waste pipe.

Client: Isn't it difficult to get this to work up and down smoothly?

Architect: No. The pipe is not suspended from above, which method is apt to allow it to hang out of plumb and bind, but slides up two inclines inside the outlet and always remains plumb, even though careless setting gets the spindle to one side (as is often done), it has no regulating screws for there is nothing to regulate; and for cleaning, can be instantly taken out by simply raising the spindle.

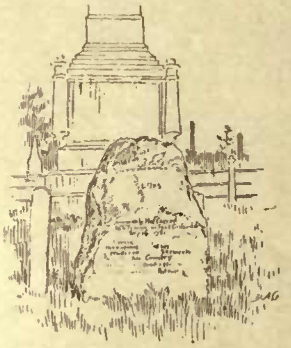
Client: Have you a cut showing this?

Architect: Yes. Here is a very good cut of the OVAL PURO.

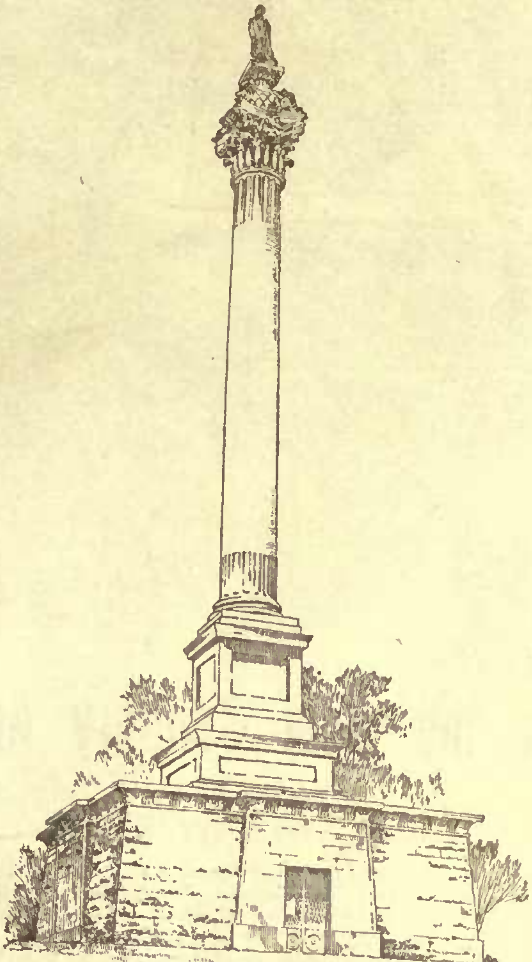


Herse over Tomb of Earl of Warwick in Beauchamp Chapel.

Gravestone at New London, Conn.



Col. Ledyard's Gravestone, Groton, Conn.



Monument to Henry Clay, Lexington, Ky. Built by John Healey.

Pillar at Ellora, India.

The Ledyard Monument, Groton, Conn.

Tomb of Juarez.

SEPULCHRAL MONUMENTS.

BINDING SECT. JUN 4 1966

NA 1 A322 v.23
American architect and architecture

PLEASE DO NOT REMOVE
CARDS OR SLIPS FROM THIS POCKET

UNIVERSITY OF TORONTO LIBRARY